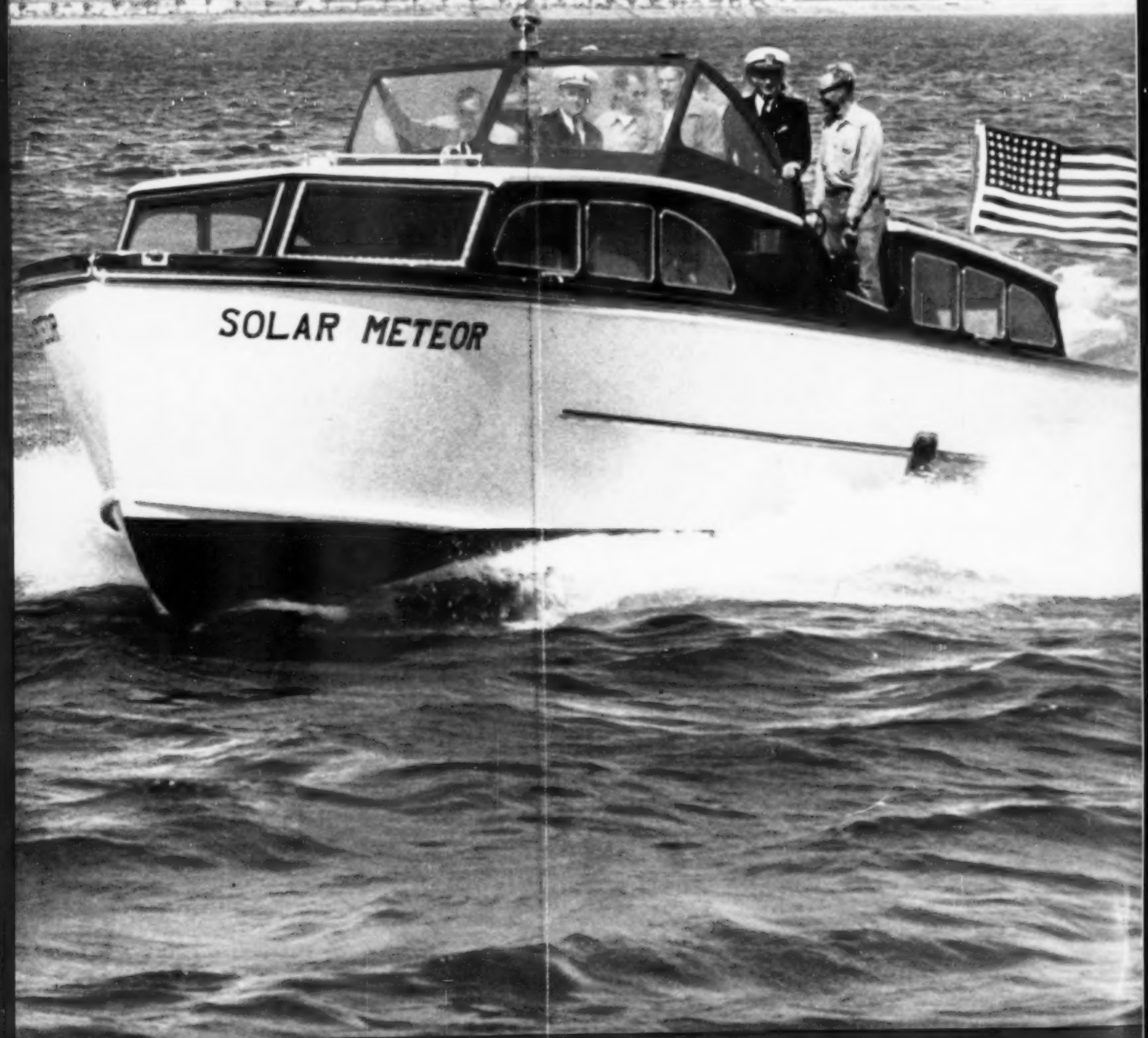
DIESEL and GAS TURBINE PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



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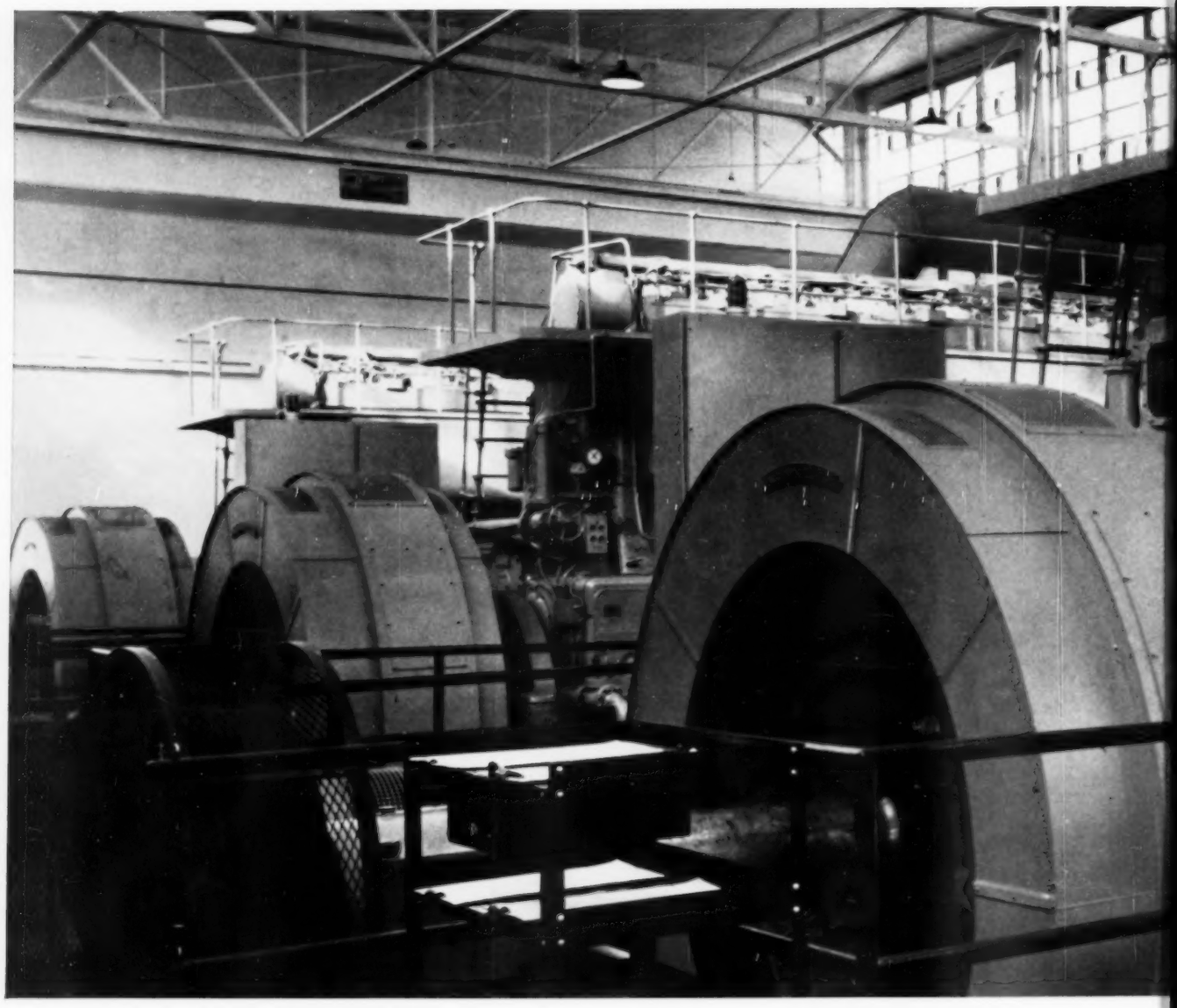
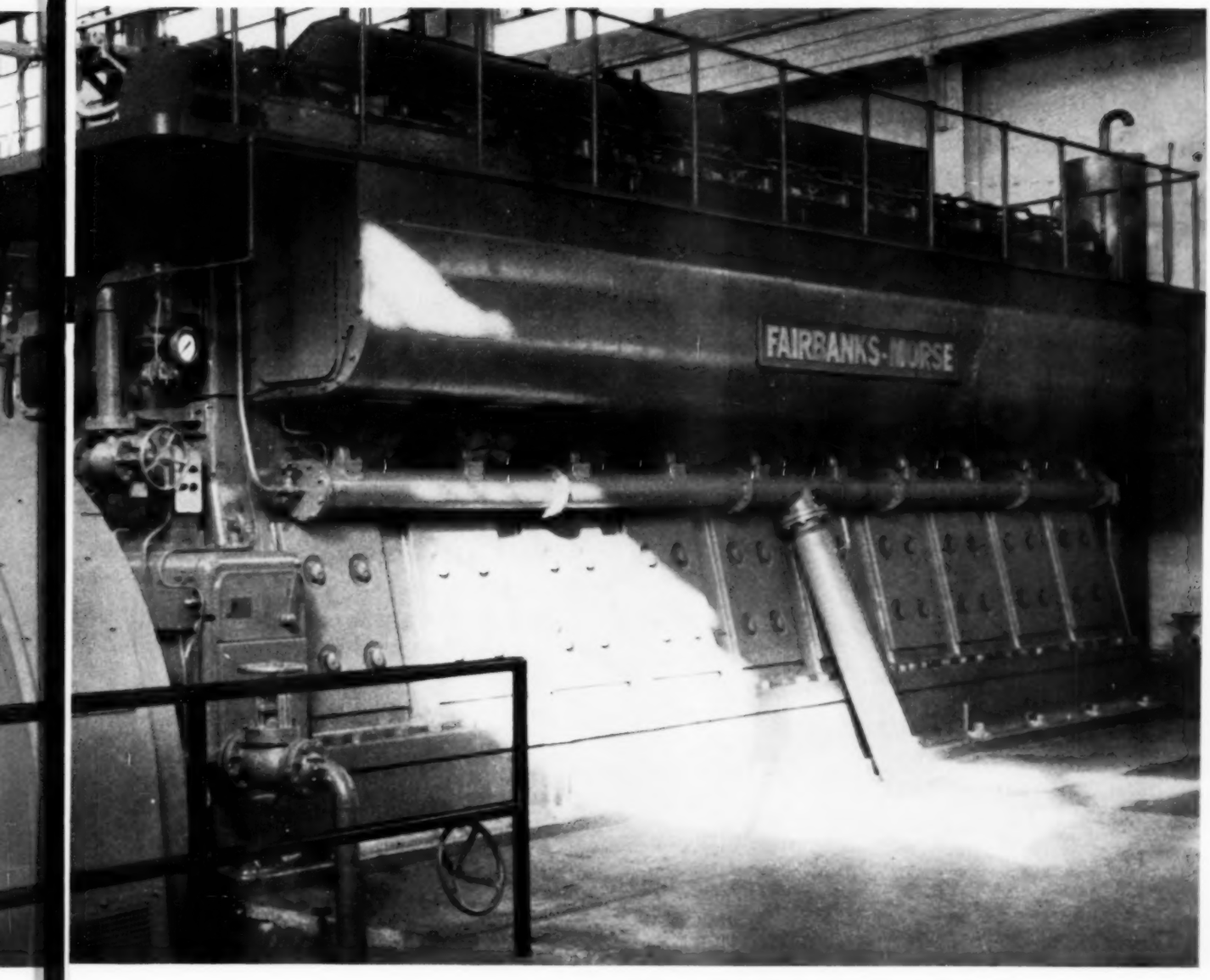


4 reasons why cost-specify TEXACO

Increasing the output of the individual engine is one way to hold the line on rising operating costs. And effective lubrication can play a major role in increasing diesel efficiency. That's why more engineers are specifying Texaco Ursa Oil Heavy Duty for optimum diesel operation. Here are the reasons:

- **Keeps engines clean.** Texaco Ursa Oil Heavy Duty is fully detergent and dispersive, resists oxidation.
- **Keeps rings free** for full compression and complete combustion.
- **Increases parts life.** Bearings, pistons, liners all last longer with Texaco Ursa Oil Heavy Duty.
- **Reduces cost** of maintenance, minimizes fuel consumption.

Carefully refined and fortified with effective additives, Texaco Ursa Oil Heavy Duty assures *more* power with less fuel over *longer* periods between overhauls. That's why, *for over twenty years, more stationary diesel horsepower in the U.S. has been lubricated with Texaco than any other brand.*



conscious engineers Ursa Oil Heavy Duty

A Texaco Lubrication Engineer will gladly give you full details on the lubrication needs of all diesel, gas and dual-fuel engines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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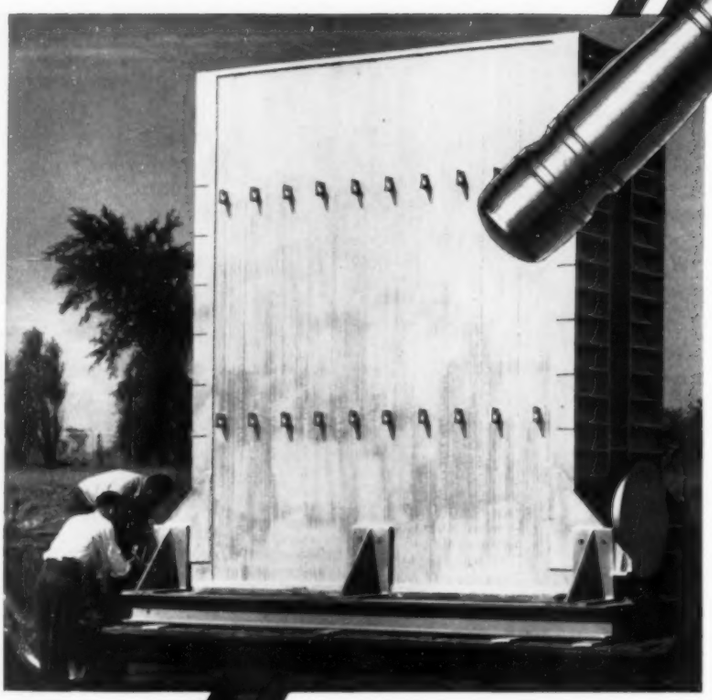
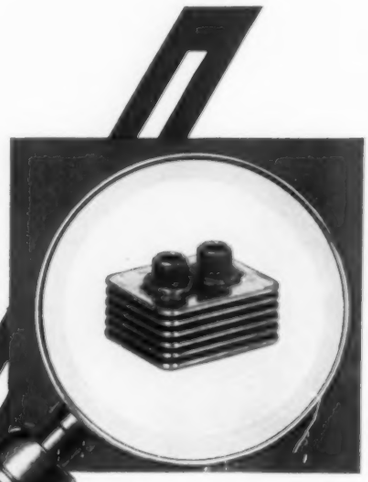
(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

HARRISON SIZES UP THE JOB...





↑

2½ lb. diesel engine heat exchanger

← 58 ton gas turbine regenerator

Meet the large and small of it!
At left is a half section of Harrison's new regenerator for a General Electric combustion gas turbine. The regenerator is used by GE to boost performance and economy on the nation's natural gas lines. The entire unit is approximately 12½ feet high, 10 feet wide and 10 feet deep.

The small but vital marine heat exchanger (above) cools the oil in engine gear boxes. It is less than three inches high, four inches wide and slightly more than three inches deep.

You'll find Harrison heat exchangers on all types of diesel equipment—automotive, marine and industrial. If you have a cooling problem, Harrison has the answer!

TEMPERATURES MADE TO ORDER

HARRISON

FROM THE PROGRESS OF THE PAST ... GM ... THE PROMISE OF THE FUTURE

HARRISON RADIATOR DIVISION • GENERAL MOTORS CORPORATION • LOCKPORT, NEW YORK

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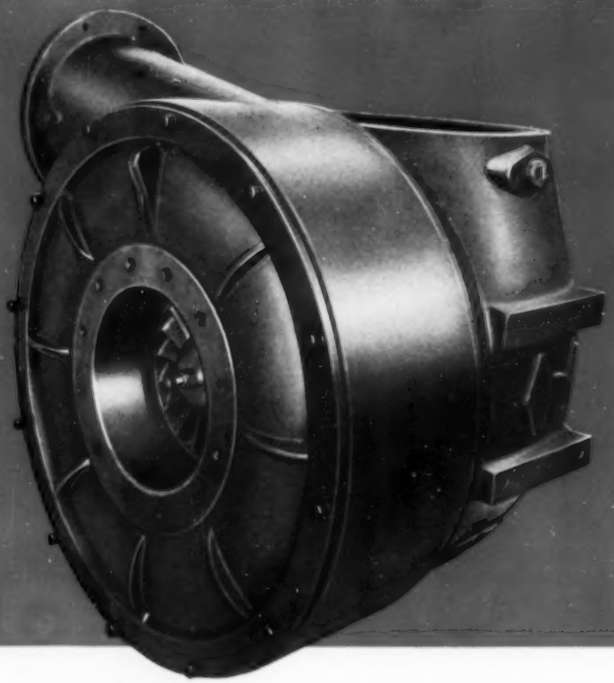
FRONT COVER ILLUSTRATION

The *Solar Meteor*, a standard 40-ft Navy personnel boat with a beam of 11½ ft and draft of 3½ ft, is powered by Solar Aircraft Company's 500 hp Jupiter gas turbine engine. It is seen skimming across San Diego Bay.

ELLIOTT TURBOCHARGERS

also serve 2-cycle engines



Elliott has 18 years of *unmatched turbocharger background.*

This successful, simplified precision rotor—the only moving part—stands up to high operating speeds and extreme temperature variations.

No other manufacturer in the United States has so much experience in building turbochargers. Elliott covers the whole field of turbo-charged engines.

ELLIOTT Company
Turbocharger Department
Jeannette, Pennsylvania

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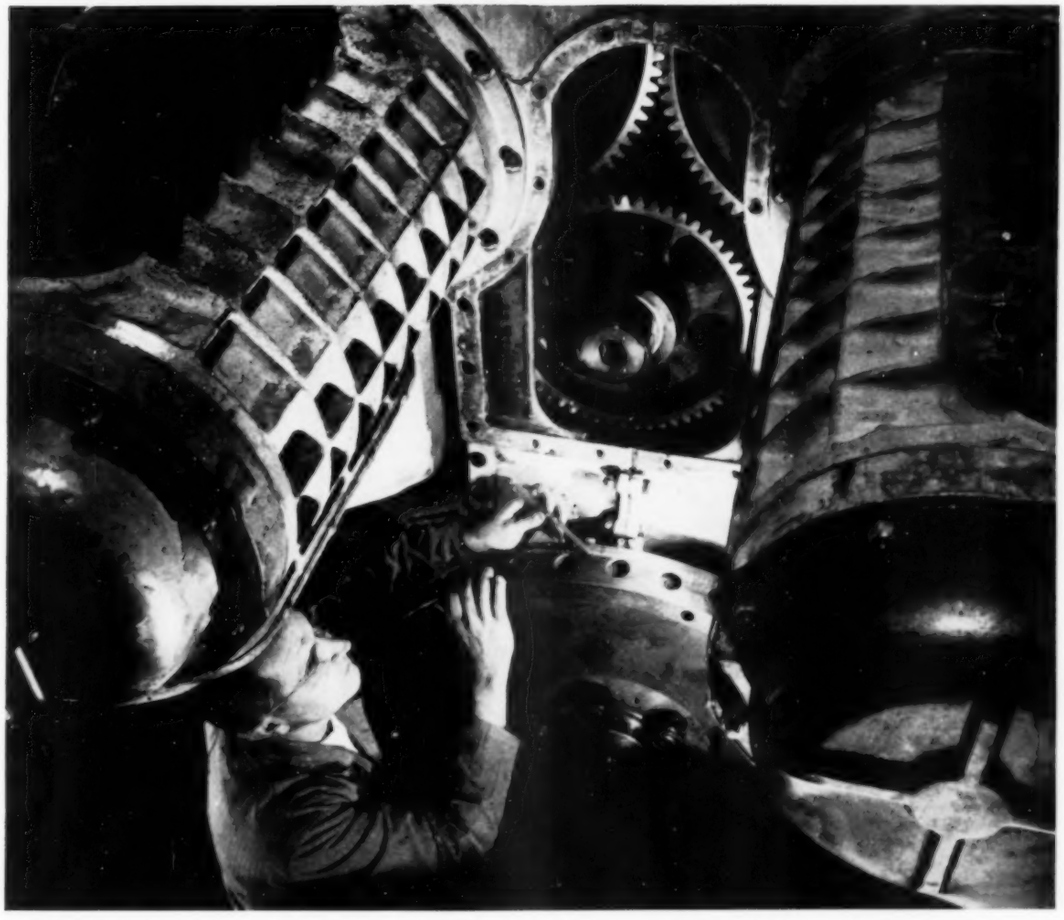
ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL RR

FIRM NORTHERN PACIFIC RAILWAY
South Tacoma, Wash.



RR diesel gears show only ½° wear in 2½ million miles

Timing gears on this Northern Pacific GMC-diesel locomotive engine, lubricated with RPM DELO Oil RR, recently completed 2½ million miles of severe freight service without repairs or adjustment. NP's South Tacoma Shop Foreman, A. R. Genin (above), indicates degree marks on engine flywheel, used to gauge gear wear. Tolerance between gear teeth shows variance of just ½° from original setting. Mr. Genin says, "We consider this low rate of wear remarkable for heavy-duty freight operation. It is typical of our experience during the 12 years we have used RPM DELO Oil in all our locomotive diesels." Engines are 1350 h.p. 16-567 series.

Why RPM DELO Oil RR reduces wear, corrosion

• Oil stays on engine parts—hot or cold, running or idle • Anti-oxidant resists lacquer formation • Detergent keeps parts clean • Special compounds prevent corrosion of bearing metals • Inhibitor resists foaming.

For More Information about RPM DELO Oils or other petroleum products of any kind, or the name and address of your nearest distributor, write or call any of the companies listed below.

TRADEMARK "RPM DELO" AND DESIGN REG. U. S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20

THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso

THE CALIFORNIA COMPANY, Denver 1, Colorado

NEW! High-pressure supercharging at low rotor speeds with Thompson Turbocharger

Simple, straight rotor vanes enable the new-design Thompson Turbocharger to produce economical high-pressure blowing of diesel engines even at low rotor speeds. Wear on parts is reduced, maintenance and downtime are kept to a minimum.

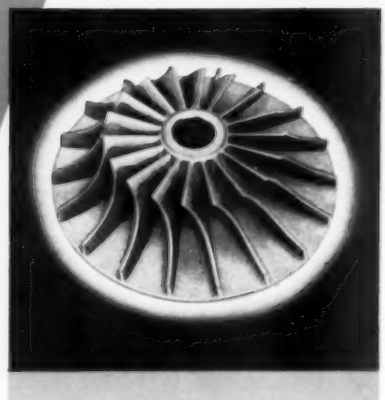
In the development labs of the Jet Division, impeller vane contours were developed to make use of Thompson's two decades of experience in high efficiency movement of air and gases.

Other *new* features of Thompson Turbochargers include unique small-diameter shaft and bearing to provide lower shaft surface speeds at equal compression ratios. Bearing and shaft wear is kept to a minimum. In addition, unique Thompson design keeps exhaust heat from traveling to bearings and compressor side of the Turbocharger.

If you build supercharged diesel engines up to 300 horsepower, we can supply a Thompson Turbocharger to provide even more horsepower and fuel economy. If you install diesel engines in trucks or diesel-powered equipment, you'll increase horsepower without increasing engine size by specifying Thompson Turbochargers.

Our sales engineers will help you make the switch to Thompson Turbochargers with practically no redesign of exhaust or intake side. When may they call?

JET DIVISION
Thompson Products, Inc.
Cleveland 17, Ohio



Write today on your company letterhead for Booklet DPR-358, which contains technical data on Thompson Turbochargers for blown diesel engines up to 300 horsepower.

THEY'RE ALIVE WITH WORK-POWER AT SPEEDS YOU CAN USE!

These two completely new Allis-Chalmers diesels give you real *Do-More Power* — high-torque power that puts maximum turning effort on a shaft at the "bread and butter" speeds you actually use. They are smooth, steady, responsive to give you more profitable performance wherever you use them.

Follow-through combustion results in top fuel economy, lower operating costs.

BRIEF SPECIFICATIONS	D-344	D-516
Piston displacement, cu in	344	516
Bore and stroke	4⅛ x 5⅝	
Cylinders	4	6
Maximum bare engine horsepower (at 1800 rpm)	88	131
Power unit horsepower (at 1800 rpm)	79	122
Maximum torque at rpm	278 @ 1000	392 @ 1300
Fuel	No. 2 Comm. Diesel	
Types	Fan to flywheel engines Open or closed power units.	

Strength flows from end to end through husky, forged steel crankshaft.

Positively controlled cooling and lubricating works wonders with efficiency and engine life.

4-cycle simplicity fortifies your work-power, gives you more for your engine dollar.

Built-in safeguards provide protection, help assure dependable performance.

Ruggedness throughout means bonuses in long life, more operating hours per dollar.

Call your Allis-Chalmers engine dealer. Get the complete story on these and other Allis-Chalmers *Do-More Power* engines — 9 to 516 horsepower; operating on diesel fuel, gasoline, LP or natural gas.

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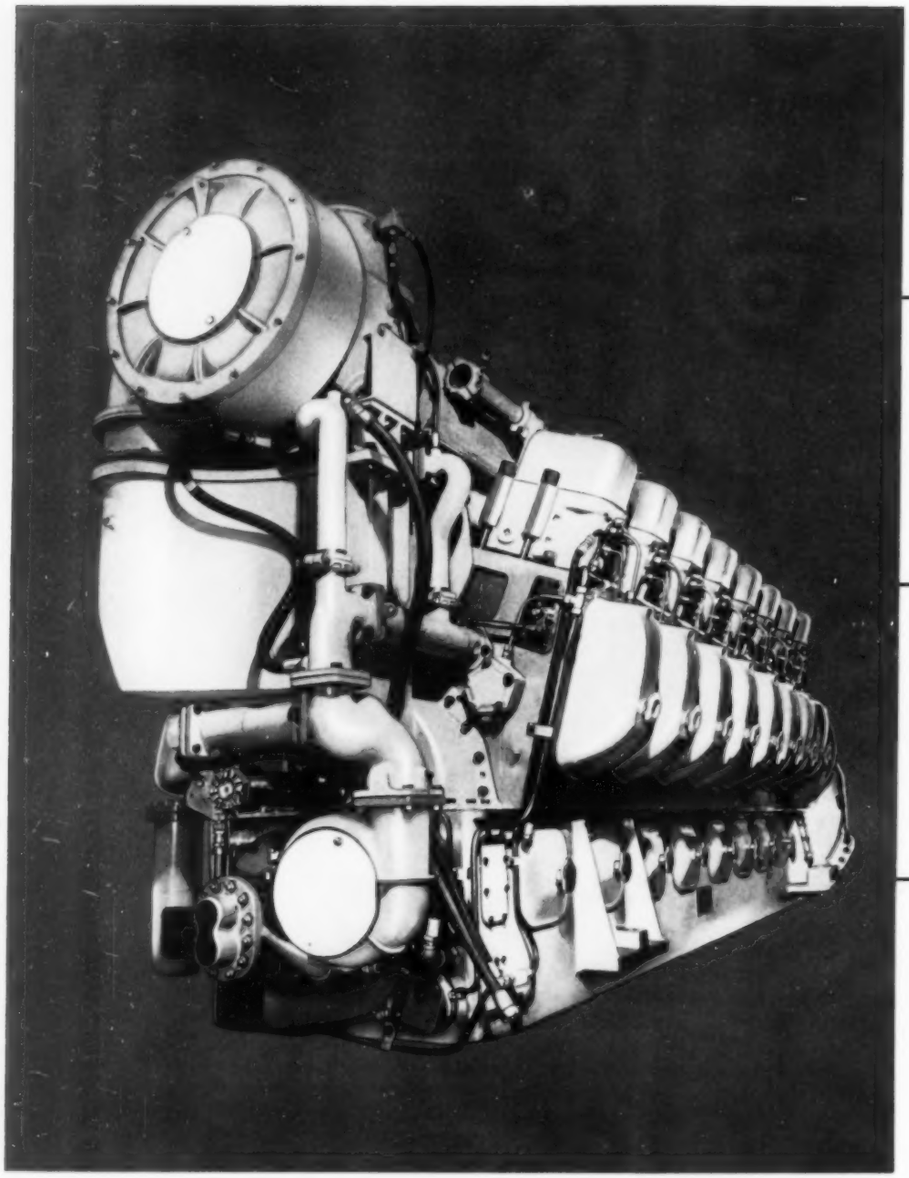
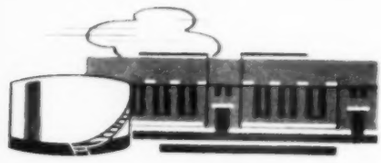
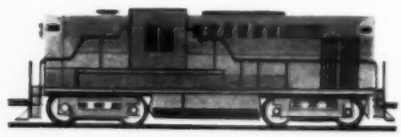


This 16-cylinder engine is the top of the 600-2400 hp range of ALCO heavy-duty, turbocharged diesels.

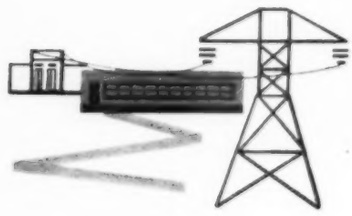
MARINE



PIPELINE



LOCOMOTIVE



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15 million diesel horsepower have been built by ALCO and proved in railroad, power-generating, marine, pipeline and oil drilling service. This 15 million horsepower is the measure of acceptance that industry throughout the world has given ALCO diesels. And, when you choose ALCO engines for your next diesel installation, it is your assurance of greater dependability and economy.

ALCO

ALCO PRODUCTS, INC.

TRANSPORTATION PRODUCTS DIVISION
SCHENECTADY, NEW YORK

DIESEL-ELECTRIC LOCOMOTIVES • DIESEL ENGINES • RENEWAL AND MODERNIZATION PARTS • REPAIR AND REBUILD SERVICES

ROUTINE or EMERGENCY

There's a WOODWARD SERVICE PLAN to meet your requirements

Woodward service assures proper installation of all the latest improvements. Our experienced personnel have at their disposal the very finest tools, testing equipment and special plant facilities to rebuild any Woodward governor in a minimum of time.

Very often, due to the addition of latest improvements, your rebuilt unit will outperform the same governor when it was new. A new governor guarantee covers work done in our plants.

Here are four ways to have your governor put in "like new" condition.

1. REPAIR AND RETURN
While your engine is shut down for other work, send the governor to our Rockford, Illinois, plant. List the governor serial number on your purchase order and make sure your company name is on the crate. Give shipping instructions and be sure to tell us when you want it back.

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Tell us when you intend to make the installation. We'll ship a governor like yours but with all the latest improvements. You can quickly install the new unit. Send the old governor to us. The cost — round trip shipping plus time and material to overhaul your old governor for our exchange stock.

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For real emergencies we'll send a man to your plant, with a governor if necessary. Our fleet of airplanes is ready to rush men and material to cope with the situation. Rare but very real emergencies usually can be handled in one day or less.

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Some competent field mechanics, experienced in small parts assembly, repair their own governors in the field. Send us the serial number of the unit, tell us what it's controlling and inform us of any suspected deficiency. We'll send Instruction & Parts bulletins and suggest parts you may need.
If you have a number of governors, send your mechanic to our plant for two to four days training. Travel and living expenses are the only costs.

Similar services are available to our European customers at our Schiphol, Netherlands, facility.

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ROCKFORD, ILLINOIS

Fort Collins, Colorado — Schiphol, The Netherlands

WORLD'S OLDEST AND LARGEST MANUFACTURER OF HYDRAULIC GOVERNORS EXCLUSIVELY

BROWN BOVERI GAS TURBINES

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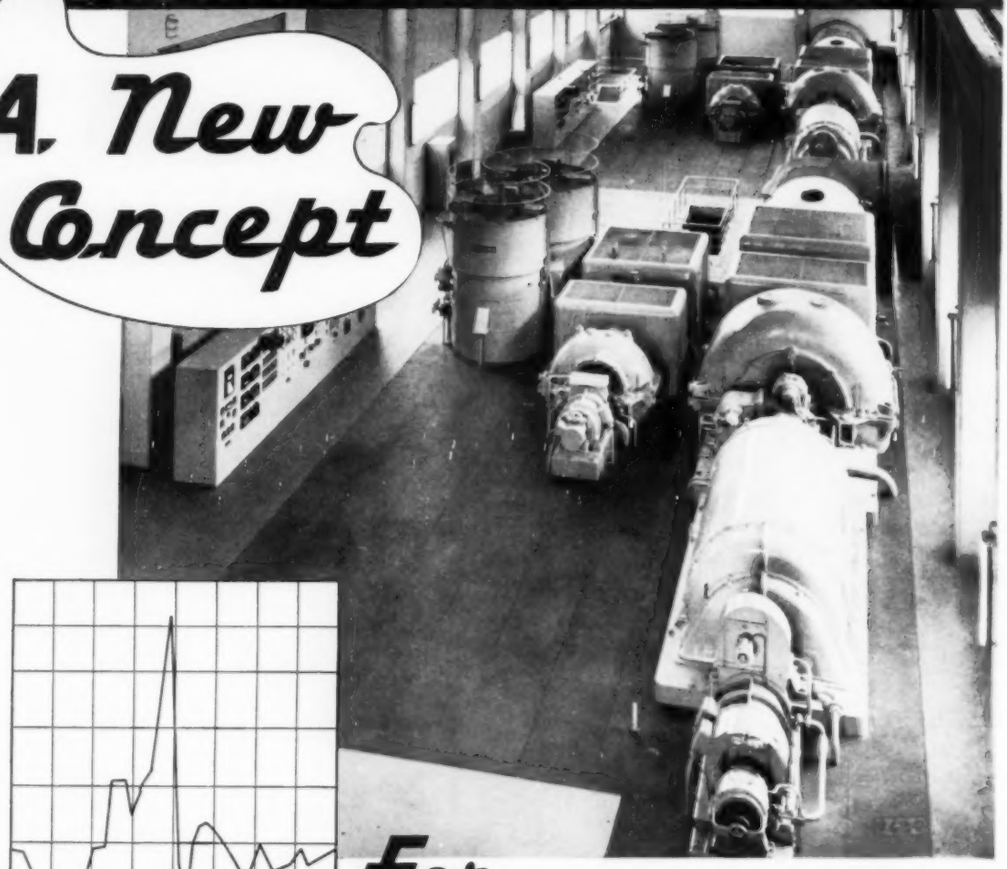

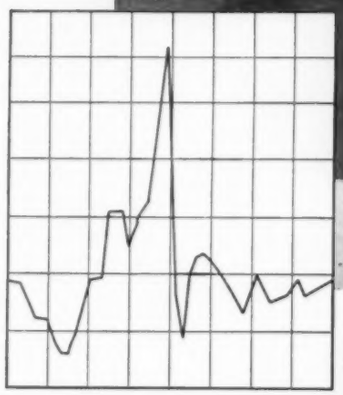

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DEPENDING on the load, either the 7,000 kW single shaft or the 25,000 kW non-regenerative cycle Brown Boveri Gas Turbine provide the answer to the rigid demands of peak load service. *They can be put on the line in 20 minutes or less.*

Their on-the-job performance records—in over 60 power plants throughout the world—conclusively indicate not only economy of operation but sizeable savings in initial costs.

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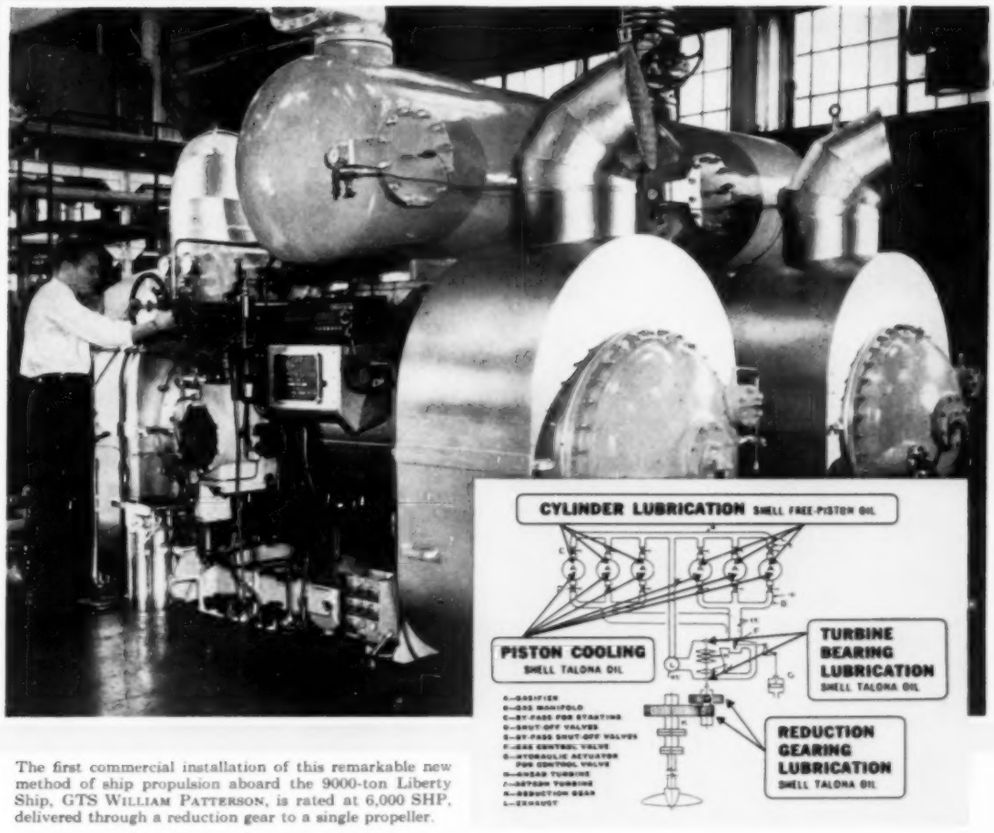

The first commercial installation of this remarkable new method of ship propulsion aboard the 9000-ton Liberty Ship, GTS WILLIAM PATTERSON, is rated at 6,000 SHP, delivered through a reduction gear to a single propeller.

Lubricating the Free-Piston-Gas-Turbine Engine on GTS* William Patterson

*Gas Turbine Ship

General Motors' revolutionary new power plant posed unusual problems in lubrication. Since the new engine combines the operating conditions encountered in diesel engines, air compressors and gas turbines—no ordinary lubricant could do the job. Oils were needed that would withstand extremely high operating temperatures and pressures. GM engineers found the answer to the cylinder lubrication problem in Shell Free-Piston Engine Oil. Shell Free-Piston Engine Oil, developed especially for this application, is used to lubricate the gas generator cylinders in which the free pistons reciprocate.

Another well-known brand, Shell Talona Oil, was selected for use in the gas turbine bearings and the heavy reduction gears. Its balanced formula combines high oxidation stability and anti-corrosive power... prevents fouling... has excellent detergent-dispersant action. Talona also circulates within the free pistons acting as an efficient coolant during all phases of the operation cycle.

For further information write to:

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, N.Y.

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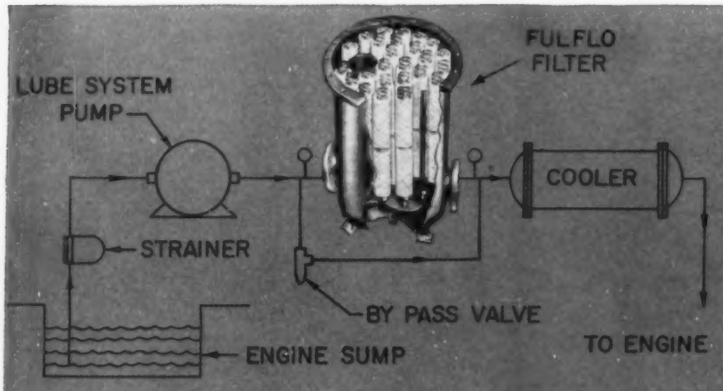
SHELL

Get longer engine life —

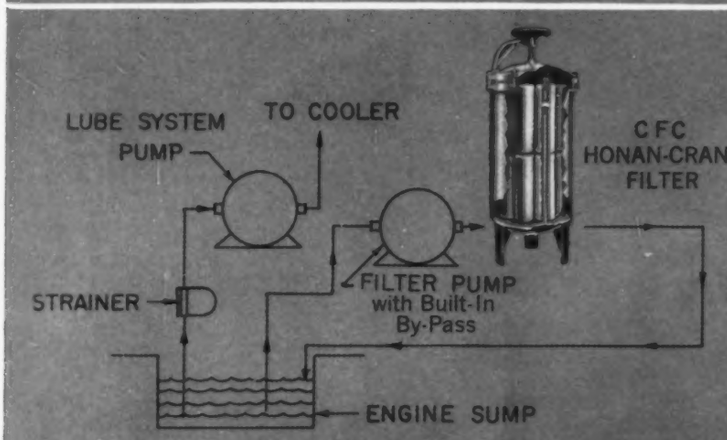
with Fulflo and CFC Honan-Crane Lube Filtration Systems



FULL FLOW SYSTEM

For True Depth Filtration: Fulflo Filters with genuine Honeycomb Filter Tubes (illustrated) provide micro-clarity of lubricating oils . . . for stationary engines, mobile equipment and for bulk filtration.

For Surface Full Flow Filtration: CFC Flo-Pac is offered in a variety of models using 1 to 35 resin-impregnated pleated paper cartridges.



BY-PASS SYSTEM

The CFC Honan-Crane Multi-Cartridge Filter (illustrated) offers seven types of interchangeable cartridges — inert media for solid contaminants, or Cranite (fuller's earth) for removal of solid particles and all products of oxidation.

CFC Michiana Filters, furnished as original equipment for many leading diesel engine builders, are available in a variety of models to provide rugged, efficient service, within a minimum space requirement.

Fulflo Filters for diesel *fuel* may be applied to either pressure or suction side of fuel line.

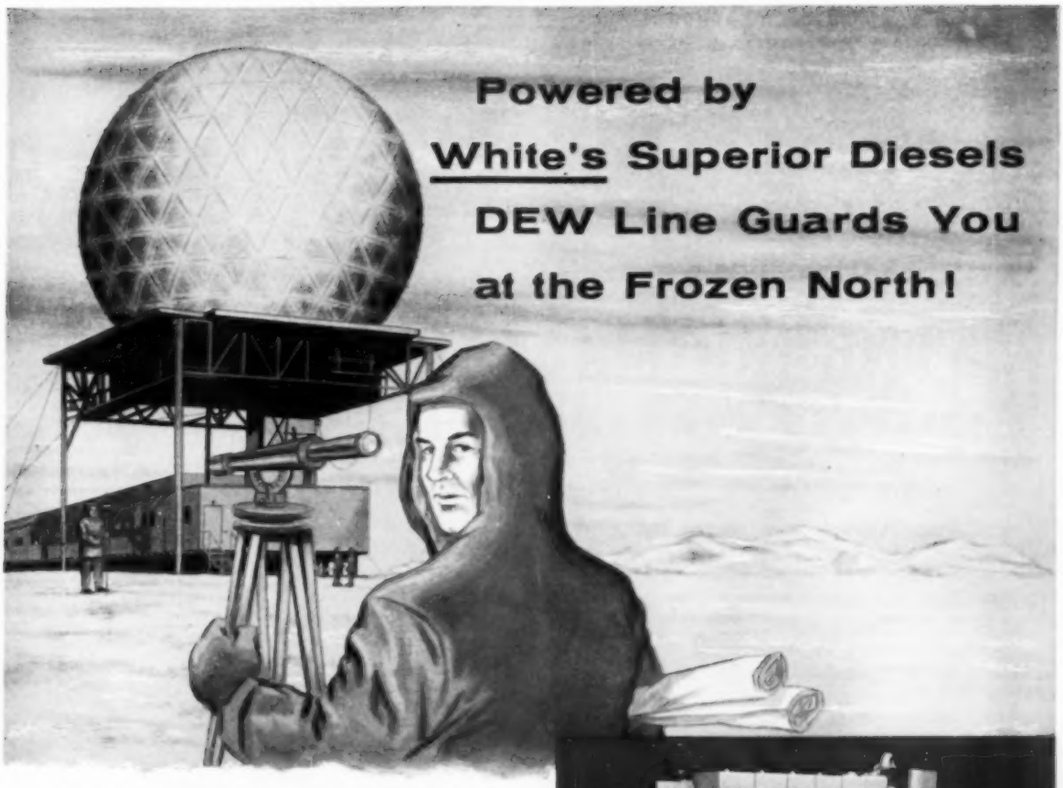
For new catalog, write today to Department *DS*

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo Filters — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC Filters — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*



Stretching 3,000 miles across Canada's Northwest Territories and Alaska is DEW Line (Distant Early Warning). This chain of radar outposts can give industrial America 4 to 6 hours warning in event of air attack via the Arctic.

Equipment needs tremendous stamina on DEW Line! Temperatures can vary 100° overnight and plunge to −70°F. Winds up to 100 Miles Per Hour drift snow as high as 20 feet. Replacement parts and fuel must be flown in or brought overland at sky-high cost. Facilities for repair are scanty or nonexistent.

White Superior Diesels met U.S. Army and Air Force requirements and were specified for power plants in DEW Line's Aleutian Islands sector. Superior engines give continuous, dependable operation and easy starting under adverse conditions. Precision construction provides the long, trouble-free performance, low maintenance and maximum fuel economy so necessary at these isolated bastions.

Superior engines help America stand guard in other defense systems too: the "Texas Towers" (Early Warning Radar Stations) and "SAGE" (Semi-Automatic Ground Environment). Similarly, White's Superior engines can be custom-engineered to your exact requirements. White's accumulated know-how includes experience with automatic, unattended and remotely controlled operations.

If you want rugged dependability in the range of 215 to 2150 horsepower, or 150 to 1500 KW, White Superior Diesels offer many advanced design features. Get complete information now!

White Diesel

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY

Plant and General Offices: Springfield, Ohio

Lighten Up By 200 lbs. Shorten Up By At Least A Foot

With The New Spicer

SYNCHRO-MASTER

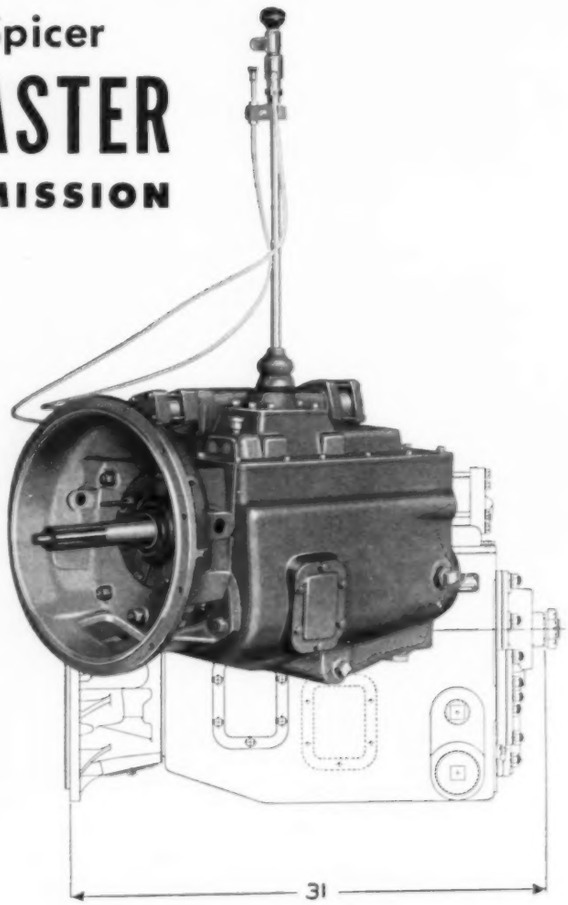
12-SPEED TRANSMISSION

Here's a new 12-speed transmission that's 200 lbs. lighter and 12″ shorter than any other unit with a like capacity. The Spicer Synchro-Master 12 actually incorporates new concepts of compactness and efficiency.

Now, for the first time, you can shorten the wheelbase by an even foot and increase payload by 200 lbs. . . . while eliminating the auxiliary transmission and two-speed axle. For the Synchro-Master 12 — with 12 evenly spaced forward ratios and 6 low-range steps in reverse — gives you top efficiency, both on and off the highway.

Available with either remote or tower controls, the new Synchro-Master 12 has blocker-type synchronizers for all speeds, forced feed lubrication, and standard 6-bolt SAE power take-off apertures on both sides. SAE No. 1 or No. 2 clutch housings are specified as required for either Spicer 14″ or 15½″ two-plate clutches.

Ask the Dana engineers to help you adapt this . . . shorter . . . lighter . . . more efficient . . . Spicer 12-speed transmission to your heavy-duty vehicle requirements. Or, write for a copy of the layout drawing of the Spicer Synchro-Master 12.



DANA Spicer

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Powr-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.

AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed Steel Parts, Traction Motor Drives, Forgings, Stampings.

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario

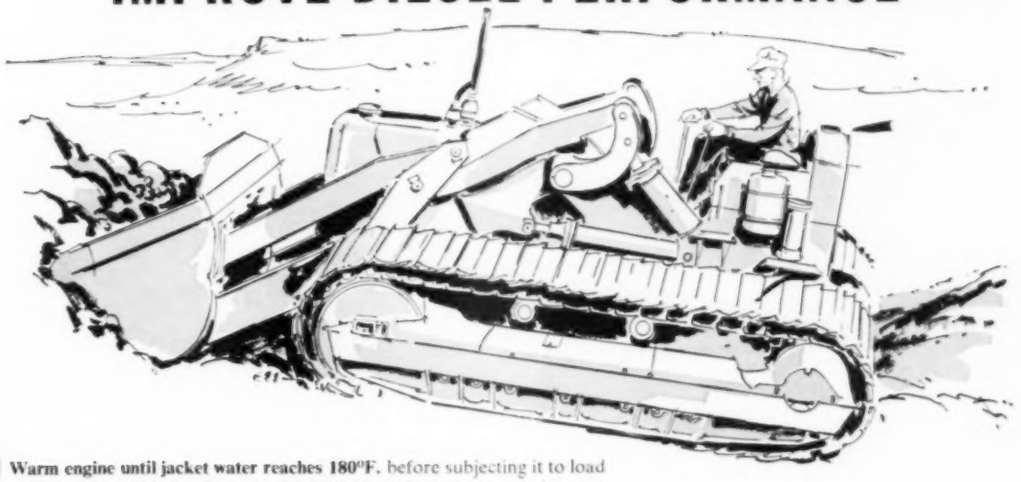
DANA CORPORATION • Toledo 1, Ohio

DIESEL FUEL and LUBRICATION

BULLETIN

CITIES SERVICE

HERE'S HOW YOU CAN REDUCE SLUDGE, IMPROVE DIESEL PERFORMANCE



1 Warm engine until jacket water reaches 180°F. before subjecting it to load conditions. If possible keep mechanized diesels in heated garage when not in use.

2 Protect crankcase pans of mobile units with shutters or similar devices that will insulate against icy winter blasts.

3 Be sure fuel injection system is working properly. If the fuel injection system permits raw fuel to reach the cylinder walls, it will impair operation by diluting with the oil and helping soot to reach the crankcase.

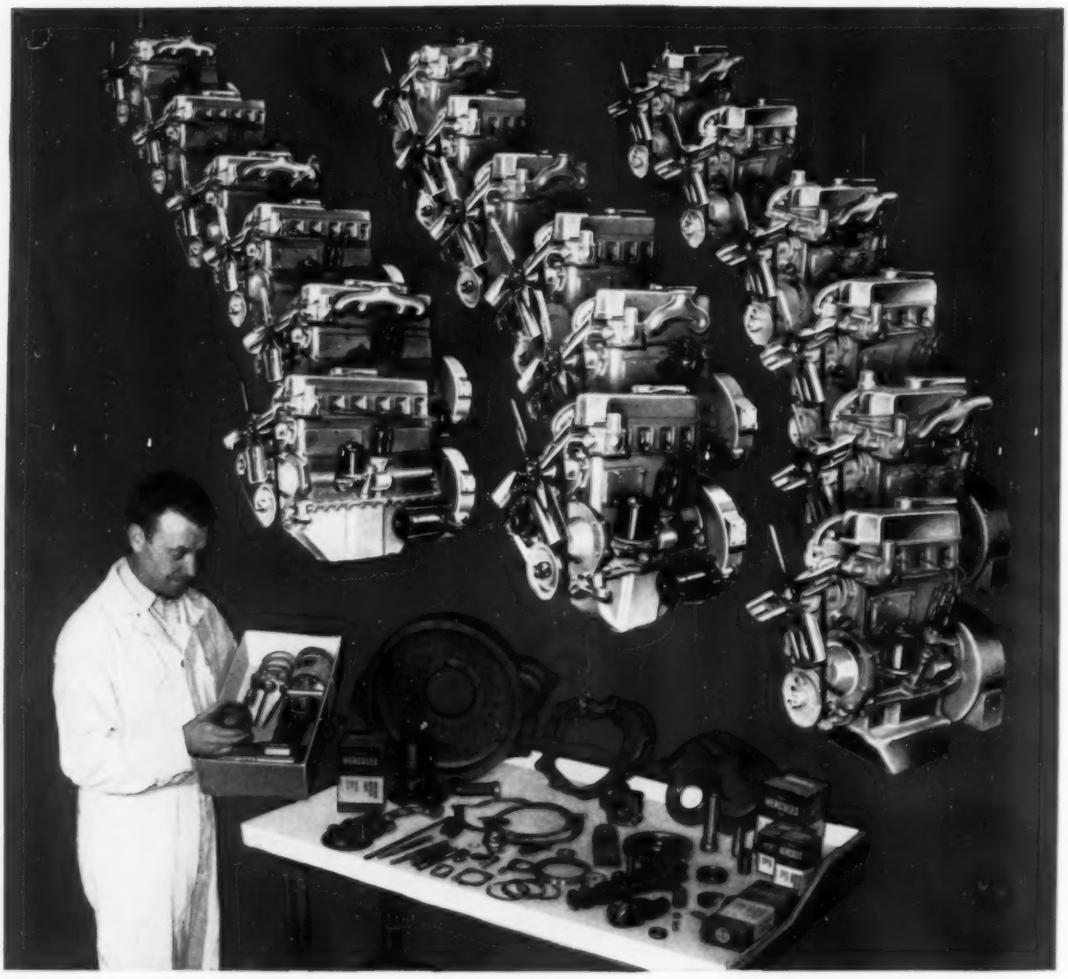
4 Avoid sooty fuel. Remember that a diesel engine normally produces five to eight times more soot than a gasolene engine. A dirty fuel—a fuel that produces black exhaust, will greatly increase this amount of soot.

5 Choose your lubricating oil carefully. Diesel engines produce more combustion impurities than gasolene engines. Consequently, it is imperative to use oil made from high-quality base stocks, with a sufficiently high additive level to protect engine parts. **For most high-speed mechanized diesels, Cities Service C-300 Motor Oil perfectly fills these requirements.** Cities Service C-300 is made from the finest base oils, strongly fortified against oxidation and corrosion. Its excellent detergent-dispersant qualities help keep insolubles in suspension, prevent engine damage. Many diesel operators credit Cities Service C-300 for doubling and tripling periods between overhaul.

6 When in doubt, consult a Cities Service Lubrication Engineer. Years of specializing in lubrication problems and recommendations enable your Cities Service Lubrication Engineer to give worthwhile advice and assistance for your operation. One of these men will gladly survey your lubrication needs at no cost or obligation. Contact your nearest Cities Service office or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

MAN YOU SHOULD KNOW

Lubrication Engineer C. J. Smith of the Cities Service office in Kansas City typifies the experienced specialists who can help you solve your lubrication problems. Wherever your plant is located – anywhere east of the Rockies – there's a nearby Cities Service office and Lubrication Engineer to serve you. For the address of the nearest office, write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.



One set of spare parts serves all these 18 HERCULES engines

Here's parts interchangeability to warm a maintenance man's heart! Hercules designed the new DD diesel and GO gasoline engines with the user in mind: succeeded in achieving a unique degree of interchangeability that reduces spare parts requirements for Hercules-powered equipment to a minimum.

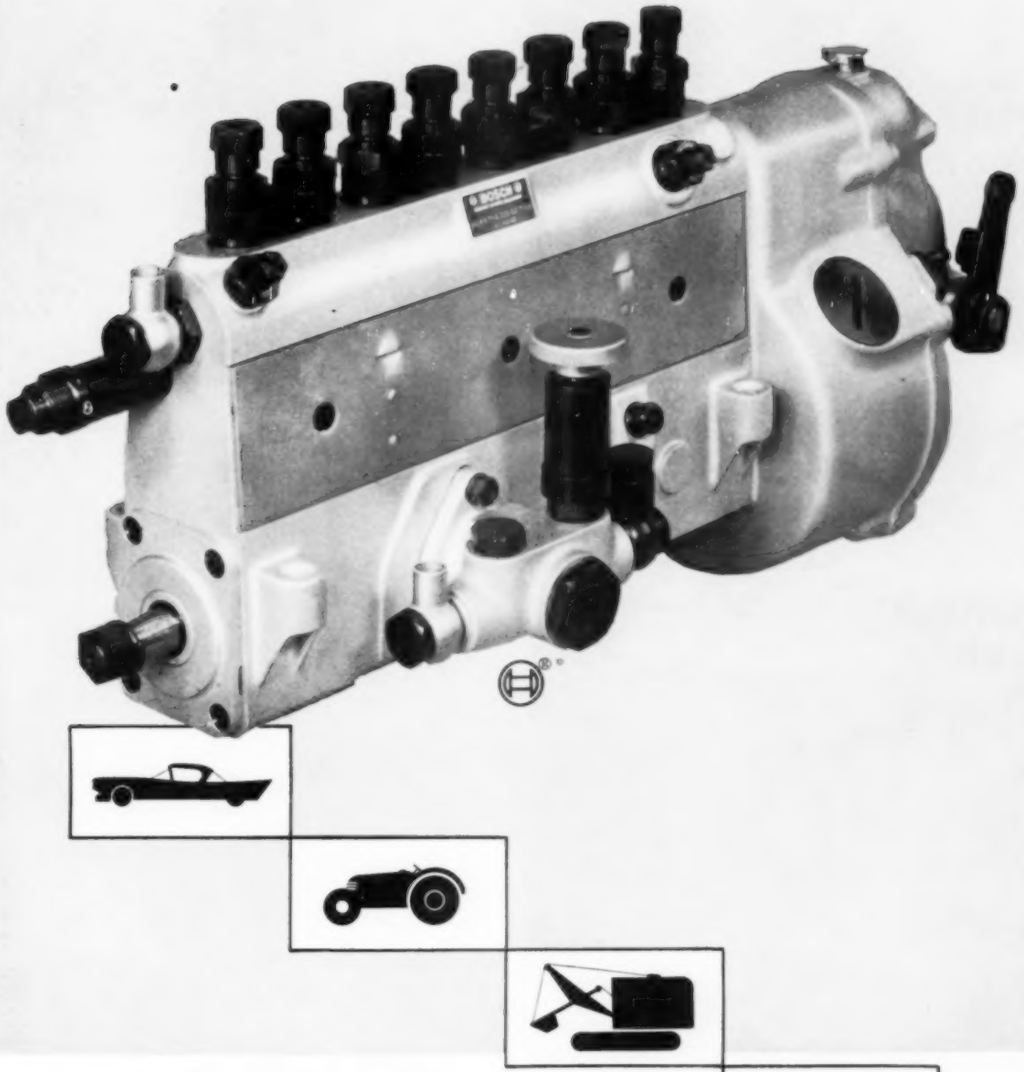
Actually, the illustration above doesn't tell the whole story. To do that, we'd have to show 6 power units as well as all 18 models of 3, 4, and 6-cylinder engines available in the DD and GO series—a total of 24 power plants using many of the same wearing parts!

You can take advantage of this maintenance economy by specifying Hercules diesel, gasoline, or LP-gas power for the equipment you buy. If you'd like the full story on these modern engines, write Hercules Motors Corp., Canton 2, Ohio—or call your Hercules distributor: there's one in the Hercules worldwide network near you.

HERCULES

HERCULES MOTORS CORPORATION
Canton, Ohio

THE PROOF RUNS INTO THE MILLIONS



Proof of injection pump performance cannot be established by the record of one or a hundred or a thousand engines. Every manufacturer knows this.

Robert Bosch Fuel Injection Equipment has been proven on millions of engines! This record of dependability stands alone in the industry.

The experience it represents is at your service now.

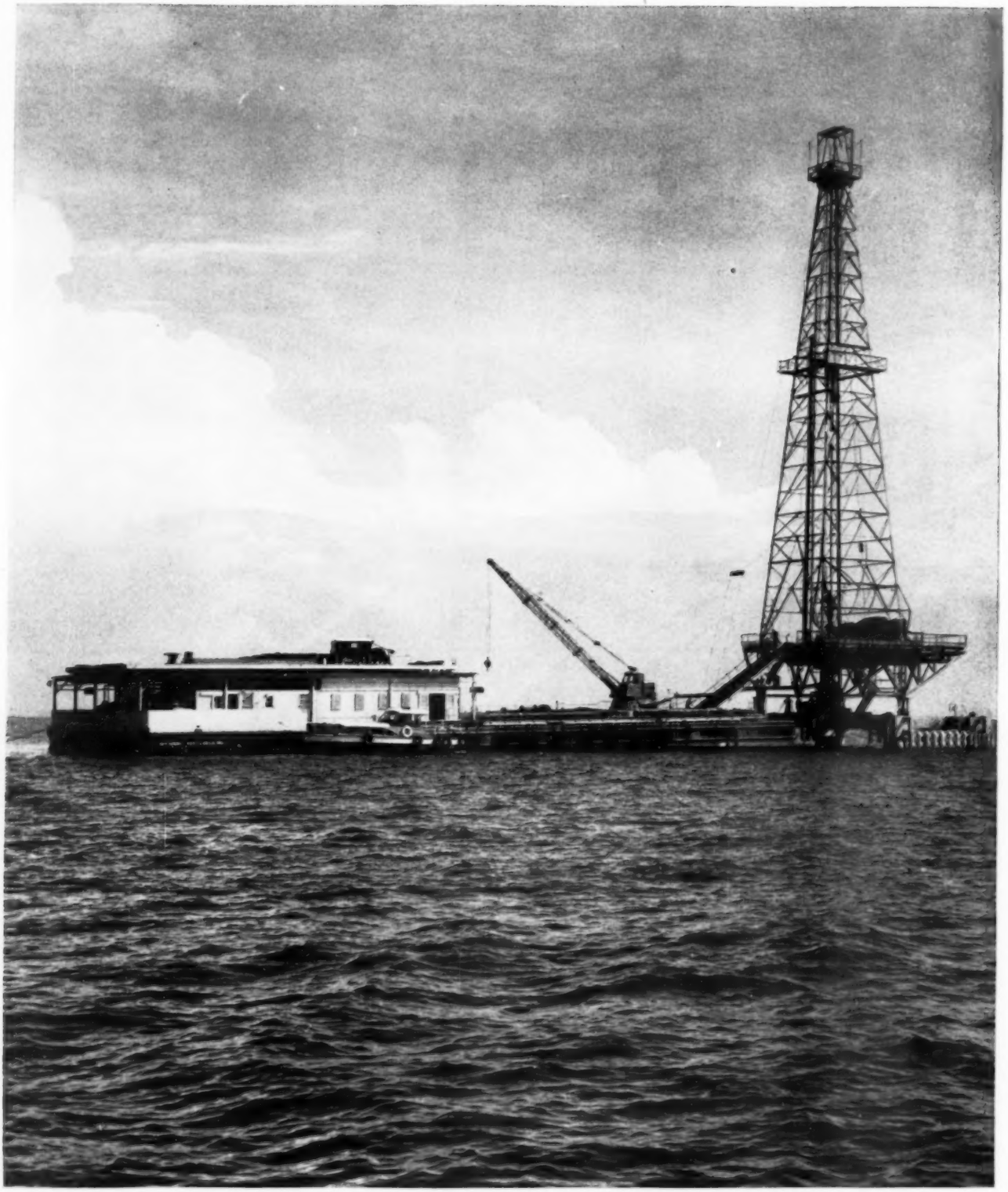
ROBERT BOSCH CORPORATION

40-25 Crescent St., Long Island City 1, N. Y. Branch: 225 Seventh St., San Francisco 3, Cal.

First in Gasoline Injection too!

Spectacular records in power, speed and economy have been achieved with Robert Bosch Gasoline Injection Equipment.

*Registered U. S. Pat. Office, Robert Bosch G.M.B.H., Manufacturers of Robert Bosch Products



Drilling in Lake Maracaibo is The Offshore Company's new barge V-1. Barge V-2 is also working in this area. These units are the most powerful Diesel-electric rigs yet to work in Venezuela. Each is capable of drilling in excess of 12,000 feet.

The Offshore Company Goes to Venezuela

—picks Electro-Motive Power with overseas service and parts facilities for two new Diesel-electric barges

The Offshore Company, first to use Electro-Motive Power in the United States, is now first to use this Diesel-electric equipment in Venezuela on their new barges, V-1 and V-2.

Each of these modern barges contains Electro-Motive equipment of 2700 horsepower, making them the most powerful Diesel-electric rigs sent to work in the Lake Maracaibo area.

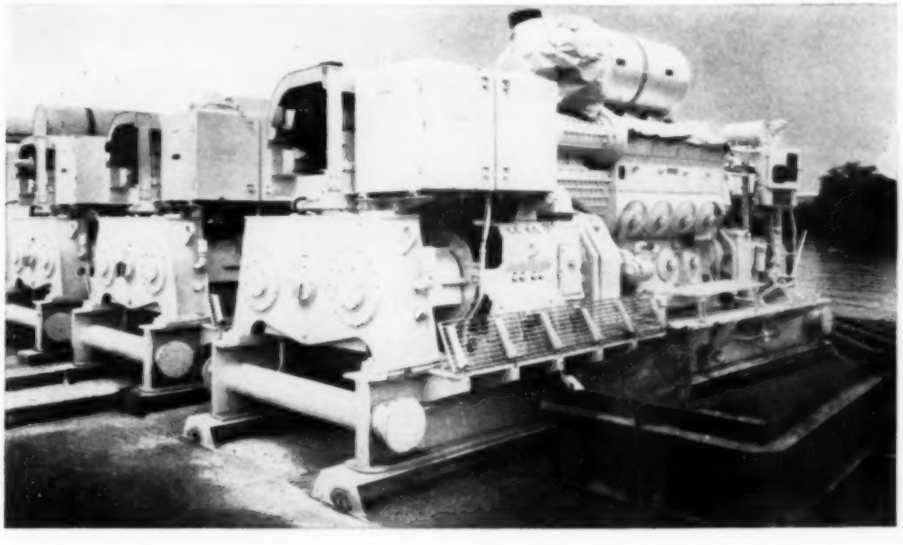
Behind The Offshore Company's choice of power for the new barges was experience with Electro-Motive Power on their record-breaking mobile platforms Nos. 54 and 55 and their fixed platform No. 25. But most important was the knowledge that they could get *local* service for Electro-Motive equipment from General Motors de Venezuela.

Factory-trained personnel head up this facility through General Motors Overseas Operations. It offers the same superior service for Electro-Motive equipment found in the Gulf. Here too, complete facilities are offered for both engine and electrical components—*one responsibility* for the complete power system.

If your interests lie in moderate or deep drilling in this country, Canada, South America, or elsewhere, look into the advantages of Electro-Motive equipment with established world-wide service facilities. See your Electro-Motive representative for details.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS · La Grange, Ill.

In Canada: General Motors Diesel Limited, London, Ontario
Petroleum industry sales offices: Dallas and Houston, Texas; Morgan City, Louisiana; Los Angeles, California.



Three Electro-Motive engine-generator sets of 900 hp each supply power to drive motors on mud pumps and draw works. These sets are heat-exchanger cooled. Sets are also available with air cooling or keel-cooling systems.

3 dependable products for the diesel industry

DE LAVAL IMO PUMPS

De Laval IMO pumps do a dependable job during long years of service. The reason is IMO design simplicity. De Laval IMO's have only three moving parts—smoothly intermeshing rotors that propel the fluid axially in a steady flow without churning, pocketing or pulsation. There are no reciprocating parts to wear or become noisy. Quiet, compact IMO pumps are excellent for direct-connected, high-speed operation. They can be furnished in capacities to 1,000 gpm and pressures to 1,500 psig.

DE LAVAL HYDRAULIC FAN DRIVES

De Laval Hydraulic Fan Drives for air cooled heat exchangers and cooling towers offer these important advantages. They *save* power since the fan operates at full speed only a portion of the time. They provide *accurate, automatic* control of engine jacket water temperature, and also assure complete operational flexibility. These units stay on the job for years. As shown, both IMO motor and speed reducer are mounted and factory aligned on a single bedplate.

DE LAVAL HIGH PRESSURE TURBOCHARGERS

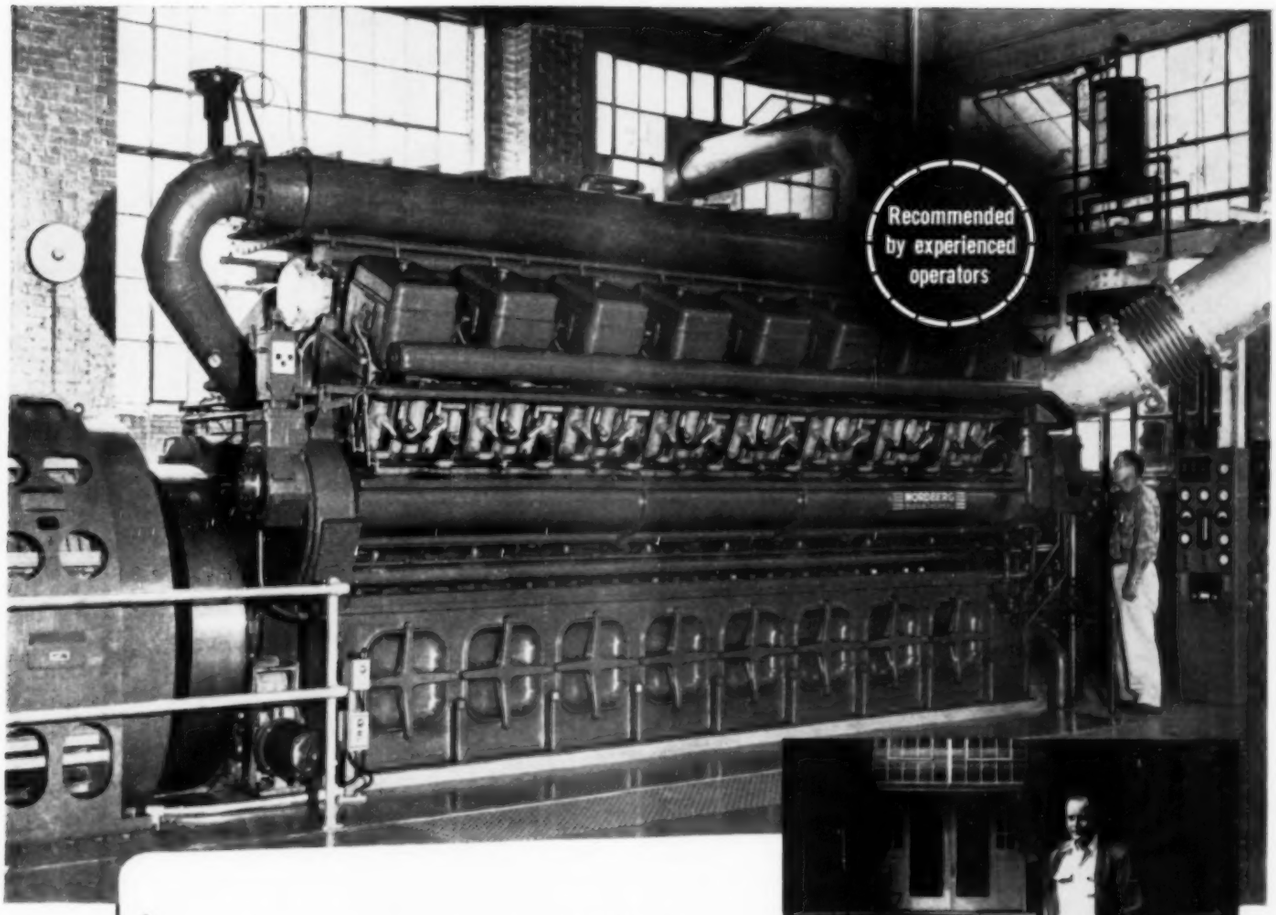
De Laval turbochargers offer pressure ratios of 3:1 as well as higher compressor and turbine efficiencies than those found in conventional turbocharger systems. Output of heavy duty diesel, gas and dual-fuel engines may be doubled by De Laval turbochargers without increasing thermal loading. Exclusive Monorotor design offers a compact lightweight unit of sturdy construction. De Laval turbochargers are self-adjusting to engine loads, can be used on 4- *and* 2-cycle engines.

You'll find additional data in these De Laval Bulletins. Write for your copies.

DE LAVAL

Steam Turbine Company

TRENTON 2, NEW JERSEY



"Neodesha has now installed their sixth Nordberg engine ...all are giving a good account of themselves..."

...says Mr. Everett Powell,
Superintendent,
City of Neodesha, Kansas

Mr. Powell writes: "*The City of Neodesha has now installed their sixth Nordberg engine since 1922—all are giving a good account of themselves. Our newest, a 3150 B.H.P. Nordberg V-16 Supairthermal Duafuel unit, has been operating very satisfactory and we expect the same excellent service as recorded by our prior installed 1750 B.H.P. Duafuel unit. Our recent overhaul on this 1750 B.H.P. unit showed that rings and bearings still did not need replacement after 40,000 hours.*"

Here, then, are more reasons why Nordberg engines are recommended by experienced power plant operators . . . more reasons why there are so many *repeat* orders for Nordberg Diesel, Duafuel®, and Spark-Ignition Gas engines. Next time consult Nordberg on your power study . . . builders of a full range of engine sizes from 600 to over 12,000 hp. *NORDBERG MFG. CO., Milwaukee, Wisconsin.*

Installation Data:

1922—Installed 2 Nordberg 550 hp engines in Neodesha plant.

1934—Installed Nordberg 880 hp engine.

1946—Installed Nordberg 1620 hp engine.

1952—Installed Nordberg 1750 hp engine.

1956—Installed sixth Nordberg engine . . . a 16-cylinder V-type Supairthermal® Duafuel engine rated 3150 bhp, 2250 kw.

NORDBERG
DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

© 1957 Nordberg Mfg. Co. P757

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

To the Employee Relations Director of every American company

LET'S FACE IT . . . the threat of war and the atom bomb has become a real part of our life—and will be with us for years. Fires, tornadoes and other disasters, too, may strike without warning.

The very lives of your employees are at stake. Yours is a grave responsibility. Consider what may happen.

When the emergency comes, everybody's going to need help at the same time. It may be hours before outside aid reaches you. The best chance of survival for your workers—and the fastest way to get back into production—is to know what to do and be ready to do it. To be unprepared is to gamble with human lives. Disaster may happen TOMORROW. Insist that these simple precautions are taken TODAY:

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's entirely integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here again, your CD Director can help—with advice on supplies needed for injuries due to blast, radiation, etc.

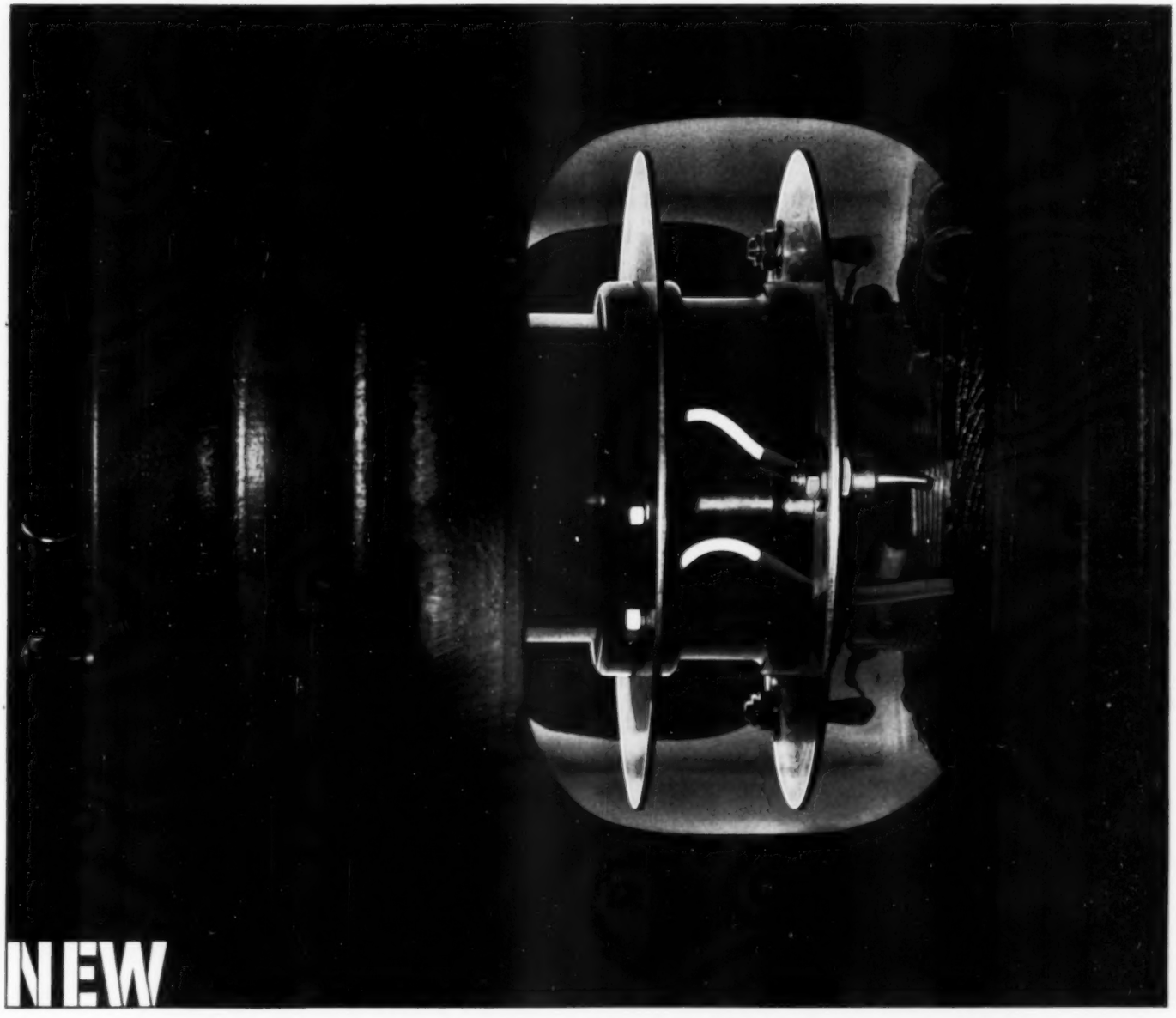
☐ **Encourage personnel** to attend Red Cross First Aid Training Courses.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good employee relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . before it's too late.

SPACE FOR THIS **CIVIL DEFENSE** MESSAGE CONTRIBUTED BY

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★



NEW SIMPLIFIED GENERATOR DESIGN

Elimination of commutator, slip rings and brushes in the new Safe-T-Generator cuts maintenance to a minimum

When Delco designed the Safe-T-Generator to eliminate all spark-producing components, they not only made a safer unit, but one requiring far less maintenance.

Use of an AC exciter and Silicon rectifiers in place of the conventional exciter with its DC commutator, slip rings and brushes eliminates direct contact of moving parts—means less wear, less replacement of parts and less downtime.

While Delco continues to make the conventional generator, the Safe-T-Generator fills an important need in such applications as railroad equipment, off-shore oil rigs, shipboard uses, abrasive dust areas and troublesome weather conditions. Get all the facts on this new generator from your Delco Products Sales Office Representative—it can mean longer, trouble-free life in your operation.

Wherever power is required from 10 kw to 300 kw, there is a Delco generator to meet the need.

GM GENERAL MOTORS DELCO

DELCO MOTORS

Delco Products, Division of General Motors, Dayton, Ohio

- APPLIANCE MOTORS
- INDUSTRIAL MOTORS
- GENERATORS
- ACTUATORS
- AUTOMOTIVE AND HYDRAULIC EQUIPMENT
- HERMETIC MOTORS AND CONTROLS
- RESIDENTIAL GARAGE DOOR OPERATORS
- AIR SUSPENSION COMPONENTS

GM

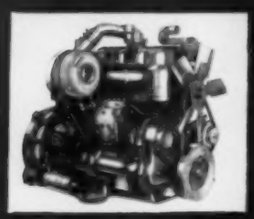
SCHWITZER TURBOS

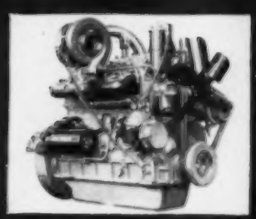
Best For Your Operation

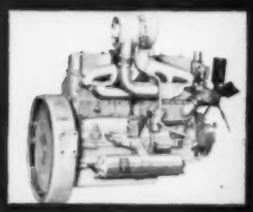
MOST HOURS IN THE FIELD

GREATEST NUMBER IN OPERATION

BEST INSTALLED PERFORMANCE







OPERATORS SAY

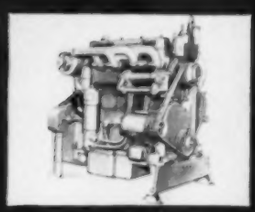
"More Power And Less Smoke"

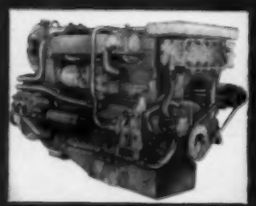
"Over 200,000 Miles Without Attention"

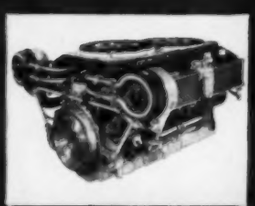
"Thousands of Hours And Still Going Strong"

"Power When You Need It And No Lag"

"More Usable Power With Schwitzer Unit"



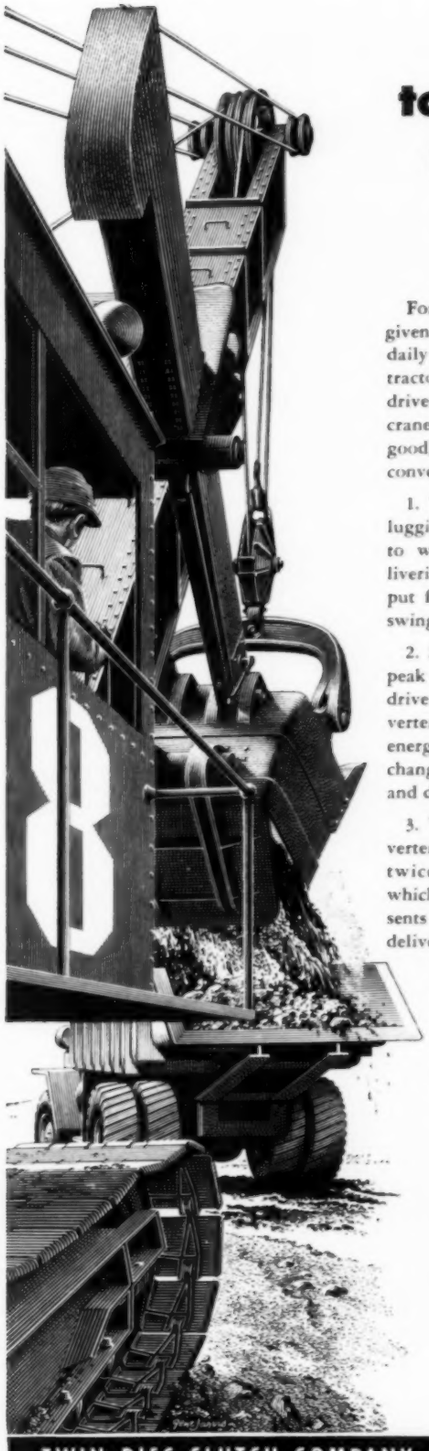




CALL ON SCHWITZER FOR THE EXPERIENCE OF MORE AND VARIED PRODUCTION INSTALLATIONS

SCHWITZER
CORPORATION
INDIANAPOLIS, INDIANA

FANS DAMPERS PUMPS SEALS SUPERCHARGERS MODULATED DRIVES AIR MOTORS



Here's why torque converter equipped machines do *more* work at *lower* operating cost

For higher work capacity on any given load, and for greater all-round daily production, more and more contractors are specifying torque converter drives in their new excavators, erecting cranes and loaders. And here are five good, profitable reasons why the torque converter is the preferred type of drive:

1. The torque converter eliminates lugging and stalling . . . permits engines to work at maximum efficiency delivering constant high-horsepower output for heavy digging loads and fast swinging.

2. *Smooth* converter power reduces peak loads throughout the machine's drive train because fluid within the converter absorbs much of the impact energy caused by quick drum speed change . . . thus protecting *both* driving and driven equipment.

3. When necessary, the torque converter smoothly delivers approximately twice normal torque to the drum, which, at slow digging speeds, represents an important advantage in power delivered to the dipper.

4. Cable life is extended since no sharp impact loads ever reach cables through the torque converter . . . constant line tension is maintained . . . there's no jerking or snapping.

5. An infinite variety of ratios is available to work with . . . permitting smooth, accurate, *safe control* of loads and delicate "inching" and "holding" under power . . . as well as adjusting for wide variations in dipper loading, substituting greater digging effort for speed, when required.

Wherever earth and rock are moved, wherever steel is erected, you'll find contractors using these five advantages . . . *to convert their horsepower into greater-than-ever profits!*

• • •

Twin Disc Torque Converters—*three-stage* or *single-stage*, from 30 to 1000 hp—are available from all leading manufacturers of heavy-duty machines. Be sure to specify one in your next unit. Take advantage of the five reasons why torque converter equipped machines do *more* work at *lower* operating cost.

Twin Disc is the world's leading manufacturer of friction clutches and fluid couplings for heavy-duty industrial applications . . . and the only manufacturer producing *both* three-stage *and* single-stage torque converters. Because of its complete line of industrial drives, Twin Disc can offer *unbiased* recommendations for any heavy-duty power transmission application.

TWIN DISC

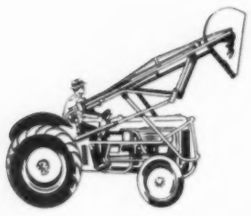
TWIN DISC

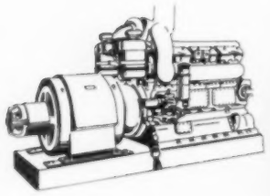
Torque Converters

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES OR SALES ENGINEERING OFFICES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • TULSA

YOUR SMALLER DIESELS CAN BE TURBOCHARGED, TOO ...AT LOW COST!





New AiResearch T-7 turbocharger is designed for diesels with naturally aspirated ratings of from 80hp to 130hp, will increase power up to 50%

A typical AiResearch T-7 installation will give a 900 lb. engine the power of a 1400 lb. engine with greatly reduced specific fuel consumption. It not only increases your payload, but, because it makes your diesel run cooler, it actually extends engine life.

Its low cost, small size, high output and extremely light weight make it the first practical solution to the turbocharging of low horsepower diesels.

Like all AiResearch turbochargers, the T-7 is air-cooled (making no demands on the cooling system of your engine), reduces noise and smoke and maintains sea-level power at high altitudes. Installed on your small diesel, it means smaller initial cost and lower operating costs than those of any naturally aspirated diesel of comparable output.

Your inquiries are invited.

BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

MODEL	T-7	T-10	T-14	T-30
Output — lb/min. (Standard Conditions)	15-30	29-51	30-60	50-100
Diameter — in. nom.	8.5	10.0	11.5	15.1
Length — in.	8.5	10.5	12.9	14.7
Weight — lb.	24.0	40.0	95.0	112.0

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

MARINE APPLICATIONS OF GAS TURBINES AND FREE PISTON-GAS TURBINES—PART II NAVAL APPLICATIONS

By JOHN W. SAWYER*
and
G. L. GRAVES, JR.**

MILITARY effectiveness and ship refueling or endurance requirements may, in certain instances, dictate that costs become secondary. For example, if a special piece of equipment is required to assure the successful operation of a ship then it becomes essential to have that item even if it is extremely costly. This in no way implies that ship board equipment is designed and procured with no consideration for the cost, including procurement, operation and maintenance. When standard equipments will do the job then they are the items that go into the ship. The marine gas turbine will be no exception. Naval uses of the gas turbine for propulsion and auxiliary power cover an extremely wide range. The requirements for power levels vary with the class ship and its intended duty. Combatant ships have propulsion demands that run from a very small percent to 100 percent power. Full power is required only a small percentage of the total operating time. Boat propulsion plants are subject to the immediate needs of the situation and loads will vary. However, it is considered that these plants will operate in the upper 50 percent power range for the greater portion of the time. Electric generators of course have wide ranges of load demands from near zero to full load. Auxiliaries such as those for fire pumps, fog generators and air supply units see only intermittent use and even then the load demand may fluctuate widely.

Naval installations of gas turbines, including free piston-gas turbines for propulsion, have shown a marked increase in the past several years. During 1957 there were some 68 naval craft with propulsion plants composed entirely of gas turbines and free piston gas turbines. These were divided among the navies of the United States, England and France. The versatility of the gas turbine unit in naval use is now well established. Its operation to date has demonstrated its good characteristics which include: 1—Reliability, 2—Minimum maintenance, 3—Rapid starting, 4—Light weight, 5—Ease of maneuvering. One of the major problems concerned with the gas turbine as a propulsion plant has been that of astern power. The methods of supplying astern power include: 1—Reverse reduction gears, 2—Controllable propellers, 3—Auxiliary engines with reversing features, 4—Astern stages built in the gas turbine. The reverse reduction gear has been used in a number of boats by the United States Navy. The power ratings range from 160 to 500 shp. The operation of these reverse gears has been satisfactory.

A 500 hp engine (Solar T-522J) was installed in a 40-ft personnel boat in order to obtain sea experience with a propulsion gas turbine in a small craft. This engine was developed and installed by the Solar Aircraft Co. under contracts with the U.S. Navy. The engine is of the two shaft or free power turbine construction. It is rated at 500 hp. The power turbine is connected to the propeller through a 10:1 reduction gear and reverse gear of conventional commercial design. The weight of the entire propulsion plant is 1385 lbs. This excludes the reverse gear which weighs about 545 lbs. The boat is a standard Navy 40 ft personnel boat which was originally powered with a 225 hp reciprocating engine. The installation of the gas turbine propulsion plant was made with due considerations for the exhaust system, noise reduction, engine compartment cooling, suitable air inlet, controls, instrumentation and operation. This boat has been operated about 15,000 miles. During this time reliability of the plant was clearly established. Tests showed that the ahead reach, from a full speed ahead to a stop, was about 90 ft. Starting was rapid. In less than 40 seconds, under one test, from the time of pressing the starter button the boat was traveling at a speed in excess of 20 knots. Boat speeds in excess of 26 knots were obtained with the gas turbine propulsion plant. This was approximately a 100% increase in speed. Based on the success of this installation the U. S. Navy has installed a 500 hp gas turbine in an LCPL. This boat is now in service for operational evaluation.

**Head, Auxiliary Section of Gas Turbine Branch, Bureau of Ships, Navy Department, Washington 25, D.C.*

**Head Civilian, Gas Turbine Branch, Bureau of Ships, Navy Department, Washington 25, D.C.*

Fig. 6—Solar gas turbine driving standby generator, 300 kw installed on the *U. S. Gyatt*. (U. S. Navy photograph.)

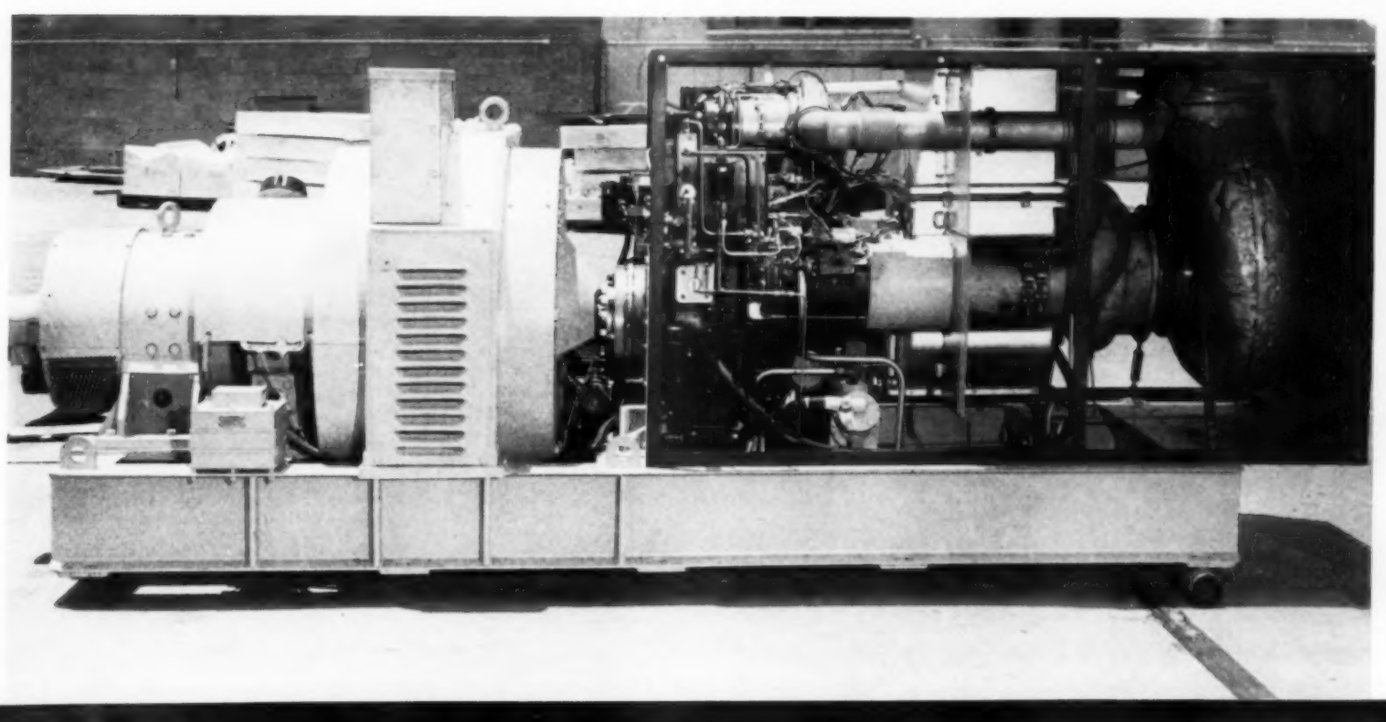


TABLE III–GAS TURBINE and FREE PISTON-GAS TURBINE PLANTS IN NAVAL INSTALLATIONS

Country	Manufacturer	Model	Power/ Plant (1)	Plants/ Ship	Application	Ship	No. of Ships	Status	Astern Power by
U. S.	Boeing Airplane	502-2&6	160 HP	1	Propulsion	LCVP	2	Installed	Gear
U. S.	Boeing Airplane	502-8c	160 HP	1	Propulsion	MSL	4	Installed	3-Gear, 1-Prop.
U. S.	Boeing Airplane	502-10c	220 HP	1	Propulsion	4 LCVP & 26 MSL	30	Installed	Gear
U. S.	Solar Aircraft	T-522	500 HP	1	Propulsion	Personnel & LCPL	2	Installed	Gear
U. S.	Pratt & Whitney Aircraft	T-34	5000 HP	4	Propulsion	Liberty	1	Installed	(2)
U. S.	Metropolitan Vickers Elect.	G2/2	4000 HP	2	Propulsion	PT	1	Installed	Propeller
England	Metropolitan Vickers Elect.	G2/1	4500 HP	2	Propulsion	MTB/MTG	2	Installed	Diesel
England					Booster Propulsion	(3)	2	On order	
England	Bristol Airplane	Marine Proteus	3800 HP		Propulsion	Fast Patrol		Building	
England	Rolls-Royce	RM-60	5400 HP	2	Propulsion	HMS Grey Goose	1	Installed	Propeller
Japan	Mitsubishi			1	Propulsion	Kokuto Maru	1	Ordered	
Japan	Escher Wyss	JN-10	10000 HP	2	Propulsion			Ordered	Propeller
France	S.I.G.M.A.	GS-34	1800 HP	1 (4)	Propulsion	Minesweep	21	Installed	Turbine
U. S.	Boeing Airplane	502-6	320 HP (2-160 HP)	2	Gen. set	MSB-5	46	Installed	
U. S.	Boeing Airplane	502-8c	160 HP	1	Gen. set	MSL	2	Installed	
U. S.	Boeing Airplane	502-10c	220 HP	1	Gen. set	MSL	28	Ordered	
U. S.	Solar Aircraft	T-520	500 HP	2	Gen. set	MSB-28	2	Installed	
U. S.	Solar Aircraft	T-520	300 KW	1	Gen. set	USS GYATT	1	Installed	
U. S.	Solar Aircraft	T-45	45 HP	1	Fire pump	Beach Lighter & PT Boat	2	Installed	
U. S.	Solar Aircraft	T-45	45 HP	1	Gen. set	Minesweep	62	Installed	
U. S.	Solar Aircraft	T-45	45 HP	1	Fog Gen.	7 LST & 13 LCU	20	Installed & Building	
England	W. H. Allen Sons	Type C	500 KW	1 for 5 2 for 2	Gen. set		7	Building	

(1) A plant includes a turbine or turbines supplying power to a single propeller, generator or other load absorbing means. All are gas turbine plants except (4).

(2) Ship propelled by 4 aviation turbines and propellers mounted to rotate and move ship in any direction for test purposes.

(3) One Frigate and one Guided Weapons Destroyer.

(4) 2 free piston gasifiers per 1 turbine plant.

Fig. 7—LCPL equipped with 500 hp Solar gas turbine and reverse reduction gear.

TABLE IV–GAS TURBINE ENGINE CHARACTERISTICS

Manufacturer	Model	Continuous Power	Description (1)	No. Engines In Use (2)	No. Engines Ordered	RPM at Gear Output	Wt. in Lbs. Include Gear	Turbine Inlet Temp. ° F	Pressure Ratio	Specific Fuel Consumption Lbs./HP hr.
W. H. Allen Sons	Type C	500 KW	SS	1	8	1800	11200	1380	10:1	1.1 (3)
W. H. Allen Sons	Type B-1	125 KW	SS		1	3600	750	1300	2.5:1	2.3 (3)
W. H. Allen Sons	Type D	350 KW	SS	2	4	1500	3000	1380	2.7:1	1.93 (3)
Blackburn	Turmo 600	350 HP	SPT	0	2	2370	310	1500	4:1	1.15
Boeing Airplane	502-2-6-8c	160 HP	SPT	1		2750	236	1550	3:1	1.35
Boeing Airplane	502-10c	200 HP	SPT	4	60	2880	325	1535	4:1	1.06
Bristol Airplane	Marine Proteus	3800 HP	SPT			5130	2900	1476	6.4:1	.66
British Thomson Houston		1200 HP	SPT-R	1 (4)	0	3000		1160	4.2:1	.7
British Thomson Houston		5500 HP	I R W	1 (4)	0	3840		1200		.5
General Electric		6000 HP	SPT-R W	1	0	114		1450	4.9:1	.51
Metropolitan Vickers Elect.	G2/2	4000 HP	SPT	2		1100	9700	1436	4:1	.85
Metropolitan Vickers Elect.	G2/1	4500 HP	SPT	4		1100	9700	1472	4:1	.80
Mitsubishi		200 HP	SPT	0	0	2200	2100	1472	3.75:1	1.2
Mitsubishi	EWJN10	10,000 HP	C I R SPT	0	2	350	325000	1330	3.8:1	.50
Mitsubishi		2500 HP	I R H	0	0	150	77000	1290	10:1	.50
Pratt & Whitney Aircraft	T-34	5000 HP	SS	4		1000	2590		6.7:1	0.43
Rateau	ACB	3300 HP	I R H	1		105	400000	1290	9:1	.485
Rolls-Royce	RM-60	5400 HP	SPT R-I	2	0	26000	1510	1510	18:1	0.66
Ruston Hornsby	T-A	1300 HP		1		1800	12600	1340	4:1	.91
Ruston Hornsby	T-E	300 KW	W		2	1200	4400	1470	3.5:1	.98
Solar Aircraft	T-520	500 HP	SS	5			850	1450	4.6:1	1.1
Solar Aircraft	T-522	500 HP	SPT	2		2000	1000	1450	4.6:1	1.1
Solar Aircraft	T-45	45 HP	SS	2	35	4400	65	1300	2.45:1	2.0

(1) SS Single Shaft
SPT Separate Power Turbine
R Regenerator
I Intercooled
H Reheat
W Waste Heat Boiler
C Closed Cycle

(2) Stock engines for replacement not included in this figure

(3) Lbs. of fuel/KW-HR.

(4) 1200 HP unit replaced by 5500 HP unit

The gas turbine's characteristic of low specific weight and volume, packing high power into small packages, offer a real attraction for high speed boat propulsion. The British Navy has installed two Metropolitan-Vickers G2 gas turbines in each of two boats, the *Bold Pioneer* and the *Bold Pathfinder*. These engines are rated at 4500 hp. Starting was accomplished by an air system. This proved satisfactory for the engines reached idling speed in about 30 seconds. Operation at sea necessitated water washing of the compressors with fresh water to remove salt deposits due to salty spray fouling. Much valuable data on operation, instrumentation, maintenance, installation and design was developed during the extensive trials of these boats. The application of the free piston-gas turbine to naval propulsion has been rather limited. The French Navy placed a minesweeper, the *Sirius* class, in operation in early 1953 with two GS-34 gasifiers and a gas turbine on each of two shafts. Within the next three years a total of twenty-one minesweepers of this class were operating with the free piston-gas turbine propulsion plants. The power per shaft is about 900 hp. Astern power is obtained by reversing stages in the gas turbine. As of 1956 these ships had accumulated over 40,000 hours of operation at sea. Auxiliary applications of gas turbines in naval service cover a wide variety of uses. These include: generator (emergency, standby, continuous) drive, fog generators, pressurized air supply, deicing, fire pump, starting for larger gas turbines and air supply for air winches.

A recent naval application of a gas turbine for auxiliary drive was the installation of a 300 kw generator set in the *U. S. S. Gyatt*. This set consists of a 500 hp Solar gas turbine driving a generator through reduction gears. The turbine, generator and starter are mounted on a common bed plate. One of the unique features of this unit is the starter which is of the combustion-air type. The generator set is required to reach rated speed and assume full load within a period of 10 seconds from a cold condition. It has consistently started within this time limit. To date some 700 starts have been made. The inlet and exhaust ducts must be carefully designed and installed in order to minimize pressure drops and resulting loss in performance. The weight of this ducting is properly charged against the gas turbine generator set weight. In this installation the entire ducting, inlet and exhaust, and insulation was just over 1200 lbs. This is considered a most satisfactory amount since the weight of the engine-generator package is only 7500 lbs. A Ruston Hornsby Model TA gas turbine driven generator set, has been installed on the *H. M. S. Cumberland*.

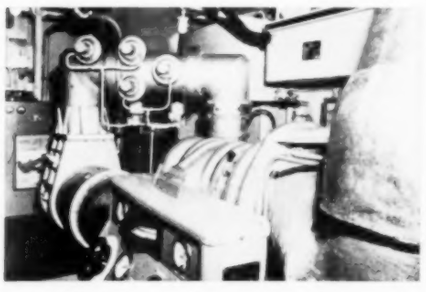
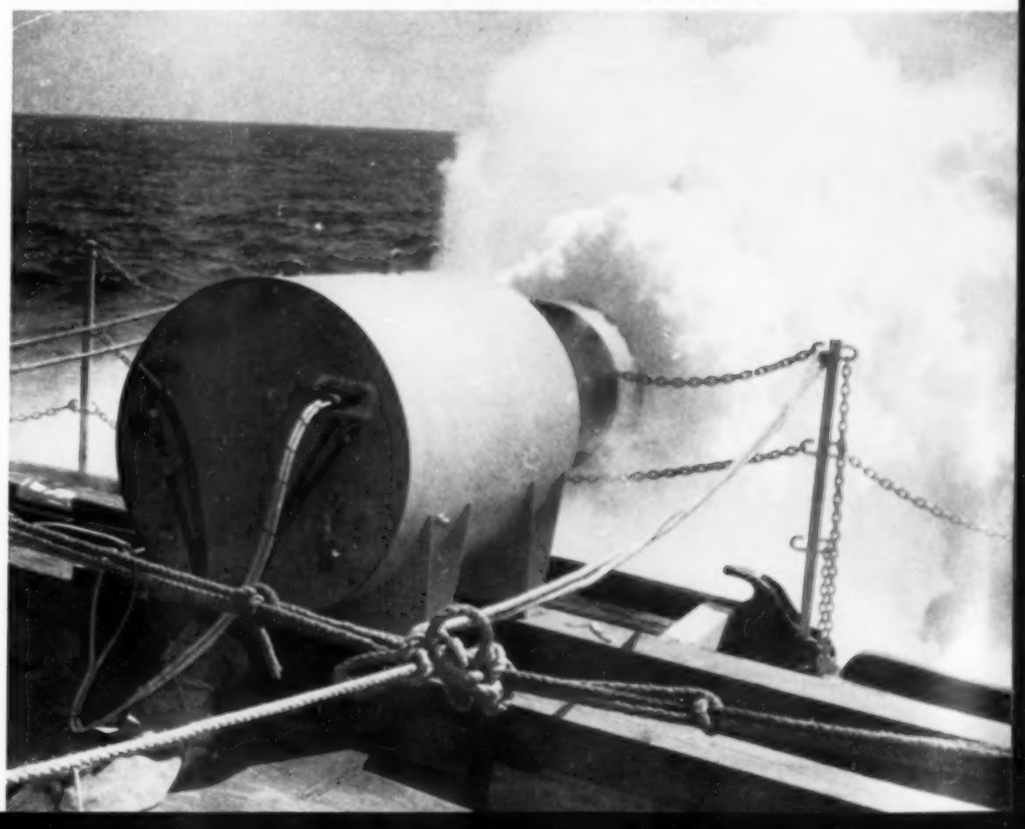


Fig. 8—Ruston Hornsby, Ltd., gas turbine, Model TA, driven generator installed on *H. M. S. Cumberland*. (Photograph courtesy of Ruston Hornsby, Ltd.)

The first marine gas turbine engine that was produced in relatively large quantities was the Boeing 502-6, 160 hp unit. This engine is used to power auxiliary generator sets on U.S. Navy minesweepers of the MSB-5 class. Some 184 of these gas turbines have been in operation for several years. In the early operating experience there were problems that proved troublesome. These included carbon formation and blade failures on the gas producer turbine. Redesign of combustors and blade shape has eliminated these early trouble areas. The total operating time on the engines in this particular class ship is now approximately 60,000 hours. One engine has recently completed an accelerated life test in the laboratory. During this test the engine ran at about 90 percent power for 2300 hours. The performance during the life test was very good. A second gas turbine has also been used on two other minesweepers for auxiliary power. This is the Solar T-520, 500 hp engine. The performance on this gas turbine has been good. A 1500 hour accelerated test was recently completed on one ship installation involving two of these turbines. Results of this series of tests show the engines to be very satisfactory. However, there are several minor changes, including nozzle and stator modifications, that will be made on future engines as a result of this sea experience.

The ability of the gas turbine to generate fog has furthered its field of use in naval service. Tests have shown that the modification of a turbine to convert it to a fog generator are minor. In a propulsion or auxiliary engine fog can be generated by injecting fog oil into the turbine exhaust. Seven new LST's of the U. S. Navy have recently been supplied with gas turbine fog generators. These units are easily installed, started quickly and result in a substantial weight saving over the old type fog generators. The gas turbine driven fire pump is an interesting and attractive application. A Solar T-45 gas turbine engine has been adapted to drive a small centrifugal pump for fire fighting. The pump has a capacity of 500 gpm at 100 psi discharge pressure. The engine-pump package is very compact and weighs some 180 lbs. It is hand started and can be easily carried by two men. The unit has been evaluated and found satisfactory for naval service.

Fig. 9—Fog generator, gas turbine, for use on seven LST's. (U. S. Navy photograph.)



A triple splash of champagne starts the 200-ft diesel towboat *Valley Voyager* down the launching ways at the Neville Island shipyards of Dravo Corporation, Pittsburgh. Sponsors for the vessel, which was built for Mississippi Valley Barge Line Company, St. Louis, were (left to right) Linda Rae McGirl, Kirkwood, Mo.; Nancy Clark Morris, Pittsburgh; and Carol Joyce Barta, St. Louis. All three girls are daughters of Mississippi Valley Barge Line officials.

M/V *VALLEY VOYAGER*

By DWIGHT P. ROBISON

A THIRD 200-ft diesel towboat for the Mississippi Valley Barge Line Company, St. Louis, was launched late last Fall at the Neville Island shipyards of Dravo Corporation. The vessel, one of the most powerful on the inland waterways, was christened the *Valley Voyager* in an unusual christening ceremony. Not one but three sponsors smashed bottles of champagne on the hull of the boat moments before she splashed into the Ohio River. All three sponsors are daughters of Valley Line vice presidents. They were: Miss Linda Rae McGirl, daughter of R. L. McGirl, vice president—operations; Miss Carol Joyce Barta, daughter of W. J. Barta, vice president—sales; and Miss Nancy Clark Morris, daughter of J. M. Morris, vice president—sales for the Pittsburgh district. Approximately 60 guests—mostly from St. Louis—who attended the ceremonies were served luncheon later aboard a barge towed on the Ohio River.

Like her two sisterships, the *A D Haynes II* and the *Valley Transporter*, which were launched at the Dravo yards in 1955, the twin-screw *Valley Voyager* will operate principally in the lower Mississippi River trade, between Cairo, Ill., and New Orleans. The three vessels are the most powerful in Mississippi Valley's fleet of 24 towboats. The company also operates more than 500 barges. Underwater design of the *Valley Voyager* is based on extensive research and studies at the Netherlands Ship Model Basin in Wageningen, Holland. Resultant improvements in hull lines, Kort nozzles, rudders and propellers have helped the *A D Haynes II* and the *Valley Transporter* to set speed and tonnage records since they went into service.

The welded steel hull of the *Valley Voyager* is 45 ft wide and 12 ft deep. Specially-designed cast steel Kort nozzles, weighing 16 tons apiece, house the twin 10-ft-diameter propellers. Cast of stainless steel, each propeller has five blades to minimize vibration. Main engines, located amidships, are two 12-cyl Nordberg diesels connected to oil-operated reverse-reduction gears. Fuel oil bunkers for the main engines and other oil-burning equipment carry enough fuel for approximately 43 days of non-stop operation. The engineer is provided with a control room containing indicator and control panels for operation of electrical and mechanical propulsion equipment. Steering underway is controlled by a small finger-length lever which actuates an electrical automatic pilot system. Close maneuvering or locking is controlled pneumatically by two small knobs. One knob operates the four flanking rudders, the other the two steering rudders.

Other pilothouse equipment includes radar, a gyro-compass, depth-finder, radio-telephone, an eight-station Teletalk system, and a complete miniature kitchen unit, consisting of refrigerator, sink and coffeemaker. All quarters are air conditioned and attractively decorated. The officers' lounge on the second deck and the crew's lounge on the main are equipped with television sets, and the crew's lounge also is equipped with a kitchenette. Teakwood flex-board paneling is used in the lounges, hallways and pilothouse. The all-electric galley contains two electric ranges, automatic dishwasher, waste food disposal unit and other modern appliances. Refrigeration facilities are installed in a separate compartment. Mess room seating capacity is 12 at any one serving. Contributing to the trim lines of the big towboat are steel plate sun visors extending around the perimeters of the main and upper deckhouses and aluminum frame sliding windows.

The towboat *Valley Voyager* has dimensions of: length (molded), 200 ft; beam (molded), 45 ft; depth at side, amidships (molded), 12 ft; sheer forward, 2 ft; draft with normal fuel, 8 ft 9 in.; draft with surcharge of fuel (700 tons), 10 ft 2 in. She is powered by two Nordberg Supairthermal V-type diesel engines. Each engine is of the four-cycle, non-reversing marine type, with 12 cylinders of 13-in. bore and 16½-in. stroke. Hindmarch-De-Laval reverse-reduction gears operate through a tangential spring coupling. Four welded steel towing knees are fitted into the bow. The hull aft is shaped to house the twin propellers in cast steel Kort nozzles. Space between the inner and outer skin of the Kort nozzles is packed with Styrofoam. Fuel oil is drawn from the bunkers and discharged into a 275-gal. capacity day tank by a 350-gal.-per-

hour centrifuge. Fuel from the day tank supplies all oil-burning equipment aboard. Make-up lubricating oil is carried in a 3000-gal. tank. Sump tanks are built into the engine room bottom. Oil is drawn from them by pumps and put through two filters, which have a capacity of 350 gph and are equipped with heaters. Reduction gear lube oil and steering gear oil are stored in separate 500-gal. and 250-gal. tanks, respectively.

The vessel is heated throughout by steam from a 360,000-btu-per-hour oil-fired boiler. Located in the generator room, the boiler operates at a steam pressure of 15 pounds per square inch. Two 10-ton compressors with water-cooled refrigerant condensers supply Freon to the cooling coils of units which air condition all sleeping quarters, lounges, mess hall, pilothouse and control room. The two five-bladed 10-ft-diameter stainless steel propellers are housed in cast steel Kort nozzles. Supporting the propeller shaft is a strut cast into the nozzle aft of the propeller. The strut bearing is a self-aligning roller bearing fitted with special seals and lubricated by a closed oil system. A 10-in.-diameter line shaft, consisting of two lengths connected by flange-type couplings, runs between the reduction gear of the engine and the tail shaft. A special coupling connects the line shaft to the 11½-in. diameter tail shaft. Three anti-friction bearings are supplied for the two shafts. Two hydraulic rams, one 14-in. for the steering system and one 12¼-in. for the flanking system, control the two steering and four flanking rudders. A 15-hp motor drives each of the two steering gear pumps. Closed center four-way valves, one for each system, control flow of oil to the rams. The steering valves are controlled in two ways—by an air system actuated by steering knobs in the pilothouse and by an automatic pilot system. A selector switch in the pilothouse permits operation of one system at a time.

Generators are located in a separate, sound-insulated compartment ahead of the engine room. The three Delco generator sets are 155 kw continuous duty, 1200 rpm, 480 volt, three phase, 60 cycle. Each generator is driven by a G-M Detroit six-cylinder turbocharged diesel engine developing 232 hp at 1200 rpm. The switchboard for the generators is also located in this compartment. Located at the forward end of the engine room and taking suction from the sea-chest is the combination fire and bilge pump. A centrifugal bronze-fitted model with a capacity of 200 gpm at 150-ft head, the pump is driven by a 15-hp motor. Two Dravo-designed capstans and two winches are included in the deck equipment. A 10-hp double-barrel capstan, designed for 22,500 lbs stalled line pull, is on the forward main deck and a 5-hp capstan is on the stern deck. The two 10-hp winches, designed for 30,000 lbs stalled line pull, are installed on the forward deck. A boat crane with 5000-lb lifting capacity is located on the roof of the main deck house. The all-electric galley is separated from the mess room by an aluminum and plastic panel partition. A separate room is used for refrigerated food storage, including about 70 cu ft of deep freezer space and 218 cu ft of refrigerator space. An 18-ft-long table in the mess room seats 12 persons.

The 200-ft diesel towboat *Valley Voyager* slides down the launching ways into the Ohio River after christening at the Neville Island shipyards of Dravo Corporation, Pittsburgh. Built for Mississippi Valley Barge Lines, St. Louis, the *Valley Voyager* is one of the most powerful towboats on the inland waterways.

AGRICULTURE WILL TAKE MORE DIESELS IN 1958

No Saturation Point in Farm Machine Market: Higher Labor, More Consumers Keep Farmers Re-Equipping for Increased Production

By F. HAL HIGGINS

THE farmer is definitely buying more diesels to power his operations in California and the West and the trend is spreading over the map. A poll of the manufacturers at the annual Christmas party of the California Tractor & Implement Club gave an optimistic forecast for 1958. With branch house managers' staffs present from International, Deere, Case, Massey-Harris-Ferguson, Allis-Chalmers, Caterpillar, Minneapolis-Moline, Ford tractors and Wisconsin engines, the mechanical end of this industry was fully represented. Then there were bankers who finance both dealers and farmers; editors of both farm and farm equipment publications; and officials from rubber, oil and chemical interests that have become mighty accessories in farm machinery. And on research development of new and revolutionary machines for the industry that has done so much to bring the machine to the un-mechanized crops of California over the past 30 years, we heard Prof. Roy Bainer, head of the Agricultural Engineering division of the University of California, casually bring the practical manufacturers to their records of having tripled the number of tractors and multiplied the combine population by four with even higher increases for such key farm machines as corn pickers, milking machines, cotton harvesters etc. All this in a decade just passing. Such momentum cannot halt with farm wages at an all-time high and the public eating higher on the hog than it ever feasted in man's history.

The California farm picture looks sound and non-fading on these points:

1. Farm labor's index is at 565 and still going up.
2. Farm income for 1957 will come close to the 3-billion-dollar mark.
3. Consumers are eating farm products at an all-time high on record employment at all-time high wages.
4. The farmer has tripled his tractor and quadrupled his combined harvester ownership in a decade of re-equipping for more production per man. The trend is not slackening.
5. Farm mechanization was recognized 35 years ago as the one industry with no "saturation point". Truer today in California than ever.

Looking back over 35 years in the industry, your Old Reporter, representing DIESEL PROGRESS, reminded the California representatives of the industry of the late Dr. Davidson's fundamental laid down before the old National Association of Farm Equipment Manufacturers 35 years ago: Farm machine industry is unique in not having to worry about a "saturation point" in farm mechanization.

"Skin" Brewer of *California Farmer* reported his statistics are just about jelled for California's farm income for 1957. They will give our farmers right close to the $3-billion-dollar mark for the year's take, he estimates. This is so close to the all-time high that it completely disproves any suggestions that our state's agriculture is ailing. True, as various members of the Club pointed out, this farmer's costs are rising all the time and he has his problems of keeping quality and production up while investing in only the machines and methods that will pay off in both first crop and long-pull farming. That means this farmer as never before is equipping and re-equipping his labor to make it produce more and better than ever before. In tractors, for example, it means more diesels.

Cotton, rice, grain, vegetables, fruits and nuts in California among the 200-odd commercial crops grown are largely powered with crawler diesels. The new models of all manufacturers the past year or so have been getting bigger to re-equip farmers who are handling more acres with their skilled labor force and/or getting in more hours per year via custom work for neighbors or on some industrial jobs like pond building, land levelling, road and street maintenance, etc. And here the trend is beginning to point to more crawlers to help solve soil packing, which is now recognized as a growing problem all over the map. Washington State College agricultural engineers definitely come out and state that crawlers pack the soil less than wheels, even when the bigger tires are put on. Also, there is a trend in the Southwest as well as California that calls for bigger tractors to plow or rip the old farms deeper to break up plow pans.

The agricultural college engineers are beginning to stress track type tractors for less soil packing, which is now one of the big problems being attacked by experiment stations all over the U.S.

Every Tractor Manufacturer Also Building for Industry

California has led the U.S. and the world in building its crawler tractors for both farming and industry. When they say industry, they mean logging, road and dam construction, pipe line building and dozens of rugged jobs that call for bulldozing, back-hoeing, loading into trucks, etc. Hence, today we find not only the old crawler builders like Allis-Chalmers, Cat, International and Oliver with more and bigger crawlers with diesel engines but Case and Minneapolis-Moline are both out with crawler tractors. In fact, Case has rapidly got its merger with American Tractor Co. rolling in one year to seriously go after the big road building business with a full line of

The diesels are getting down to the jobs that call for accurate weeding of row crops. Here is an International MD with "down-the-row" thinning for such crops as sugar beets, lettuce, carrots, etc.

The GMC diesel powered rice combines in the Sacramento Valley have been a mighty influence in the past 15 years since the first one appeared from the ranch shop of Heidrick Brothers near Woodland, California. Where they were costing around $25,000 to $30,000, the figure is near $40,000 today with some 50 of them in the annual harvests. As 1-man, self-propelled bulk machines they both cut costs and get the job done in spite of heavy going when a rain month happens along.

International MD cultivating sugar beets in California.

tracktype tractors to match the big three model for model. Also, it is entering the world markets for global competition for the heavy work. And in Europe, Ford dons tracks for both farm and industrial jobs. While no announcements are out, the Massey-Harris-Ferguson with well established factories in Australia, Canada, the U.S. and Europe is sure to be in the tracktype models soon to compete against the field.

The diesel tractor has passed its chemical tests with flying colors whether it is a fertilizer, sprays, dusts or what, it handles the job. Here is a Cat D3 keeping three men busy as the tomato field is sprayed.

The Allis-Chalmers Hd-16 is here doing a real job in pulling a Yonkers-Johnson 3-bottom 2-way plow near Queen Creek, Arizona. Operator Frank Sawyer says owners Skousen & Hasting also own an Allis-Chalmers HD-9. They farm about 2,000 acres of cotton, alfalfa, potatoes and maize.

View of Douglas Peterbilt powered with a Cummins diesel as it goes

DOUGLAS OIL PROFITS BY USING DIESELS

By KEN R. MACDONALD

A TOP-GRADE transport fleet, powered with ultra-modern diesel engines, along with astute management and the courage to plan and spend money for expansion, are credited in large measure for the resurgence of the Douglas Oil Company as one of the nation's major petroleum producers. The fully integrated oil company, headed by President Woodrow G. Krieger, has also developed an astonishingly successful program of well-planned preventive maintenance which has helped to save money and return profits.

Douglas produces, refines and markets petroleum products, with production fields in Southern California and in Peru, South America. The company has three refineries in California, at Bakersfield, Santa Maria and Paramount. A three-way expansion of its production, refining and marketing has been launched under the direction of Krieger and the eventual result will be that a considerable portion of California's new highways will be surfaced by Douglas produced asphalt and new residents will drive those highways in Douglas powered automobiles. A considerable increase in Douglas production facilities will result from the purchase of two-thirds of the Ampex Oil Corp., Long Beach, a company which has crude oil reserves totalling almost three million barrels. "We are also nearing completion of the expansion of our refineries at Bakersfield and Paramount," Krieger reports. "At Bakersfield alone we have spent some $500,000 to install a 1,300 barrel a day unifier, electric substation and storage. "At Paramount," Krieger continued, "we have added a new emulsion plant with an increased capacity of nearly 5 times our previous rate. We also have added a third air blowing still and additional storage facilities." Krieger has announced that henceforth Douglas will sell its gasoline only through company operated stations and will discontinue wholesaling to privately owned Douglas stations or under different brand names to other dealers.

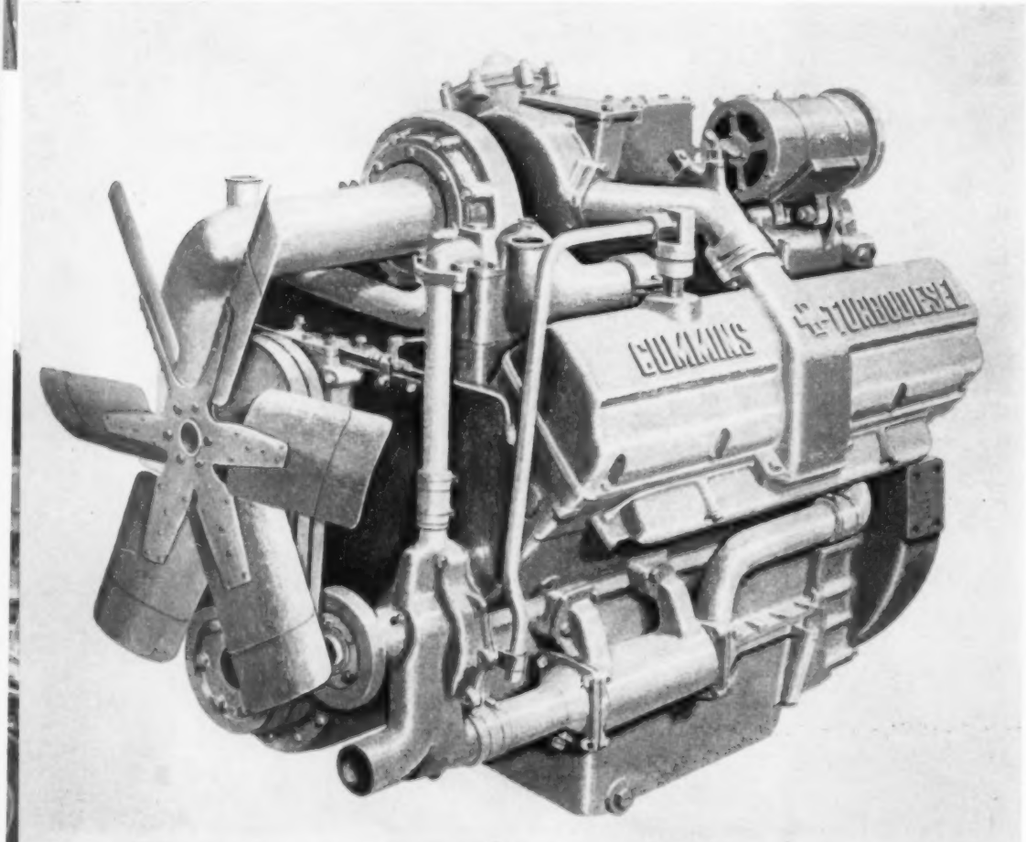
As a part of the Douglas expansion program, the company has completed construction of 8 new multiple-pump stations and is now building 12 others at a cost of $1,000,000. Douglas is one of the West Coast's largest independent producer of asphalt products and ranks third in sales and, as a diversified producer, has annual sales approximating $30,000,000.

Industry people credit a large measure of the company's success to the well-cared for dark-blue transport fleet and the maintenance program which enables Douglas to deliver its products promptly and efficiently. Douglas recently had built to company specifications a completely new fleet of more than

40 insulated transport trucks and trailers and 11 lightweight spreader units. This entire fleet is dieselized, Douglas having started the use of Cummins diesel engines in 1940. The company has since standardized on that equipment and on Peterbilt trucks. Of the Douglas power units equipped with Cummins diesels, 44 of them are powered by the 200 hp NH-600; 5 with the 250 hp Turbo-diesel NT-6-B and 3 with the 275 hp NHS-600. Douglas also holds the unique distinction of having been chosen to road test, in over the highway use, one of the two experimental V-8 diesel engines built by the Cummins Engine Co. Only two naturally aspirated V-8 engines are in the field in over the highway use, but 8 turbo-charged variations are also out for testing in various mining, logging and construction operations.

The Cummins experimental V-8 has a 5 inch bore and stroke and it weighs 2,725 net, naturally aspirated, and 2,850 net, turbo-charged, including the complete fuel system, lubricating oil pump, compressor, water pump, electric generator and starting motor. This weight is about the same as the widely used 6 cylinder 200 hp Cummins Model NHB-6. Tentatively, the naturally aspirated version of the experimental V-8 is rated at 250 hp at 2,500

¾ front view of the experimental Cummins V-8 turbodiesel, a naturally aspirated version of which is being road tested by the Douglas Oil Co. Naturally aspirated, the V-8 develops 250 hp compared with 210 hp in the longer and heavier NH.



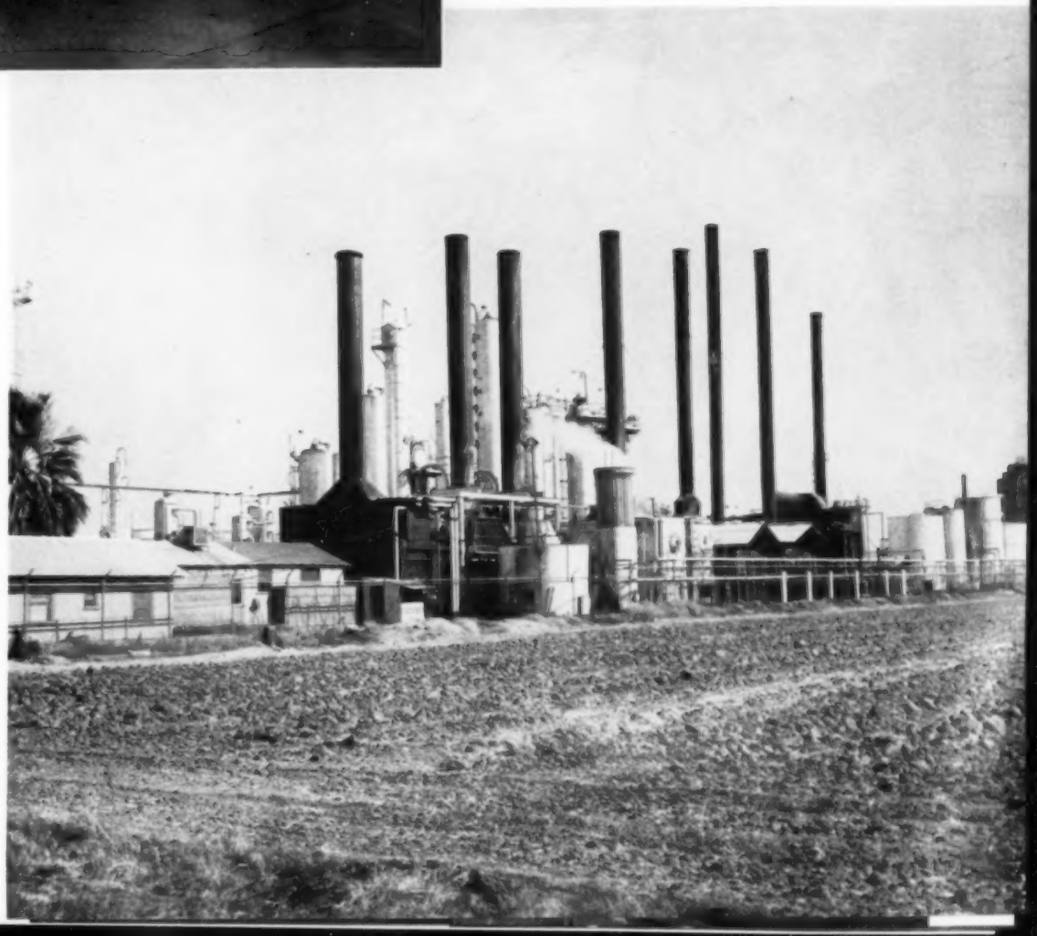
View of Douglas Peterbilt powered with a Cummins diesel as it goes through one phase of the company's extensive preventive maintenance program, a Clayton dynamometer check.

rpms and 375 hp, turbocharged. Installed in one of the Douglas company's model 531 Peterbilts, the V-8 has been given a thorough test in the run between Los Angeles and Gabes, Nev., which starts at sea level and reaches a number of 7,000 foot high passes after crossing several stretches of desert.

Perhaps the toughest test is that undergone by the 200 hp rigs making hauls between the Douglas refinery at Santa Maria and Ely, Nev., 700 miles. The trucks are loaded both ways most of the time, bringing crude oil back to the refinery from Nevada. These rigs start from approximately sea level and travel through several mountain ranges, one of which takes the trucks to 8,000 foot elevations. Ambient temperatures may range, within a few hours, from near freezing to highs of 112 degrees or more. There is a critical element involved in hauling asphalt, which makes preventive maintenance of much greater importance to a petroleum hauler such as Douglas than it might to almost any other kind of fleet operation. Asphalt is pumped into the insulated transport tanks at temperatures between 450 and 500 degrees. In spite of the insulation, the asphalt begins losing a degree of temperature an hour. The melting point is 190 degrees. Thus, if a rig should break down on a cold mountain pass and remain immobile long enough for the asphalt to cool below its melting point, the tank and the asphalt both would represent a considerable loss.

Douglas delivers asphalt throughout the mountainous states of California, Oregon, Arizona and Nevada and consequently there is a constant need for having the trucks and engines in first class shape. Drivers hold a heavy share of responsibility in the preventive maintenance program and are required to do much of the normal servicing of their trucks. In addition, they must make careful entries in their repair order books. One factor beyond the control of the driver is the amount of mileage a truck rolls up in any one month. If a well driven, properly maintained truck piles up a lot of miles that truck is bound to show a good profit. The truck that sits on the lot is equally certain to return a loss. The very heart of the effort to keep trucks rolling, consists of five maintenance forms and a new truck shop, adjacent to the company's Paramount refinery. This shop, directed by foreman John Koch, handles all of the Douglas chassis overhauls, emergency repairs, regular maintenance and tire changes. Major overhauls are turned over to the Cummins Service and Sales shop in Los Angeles.

View of the huge Douglas Oil Company refinery at Santa Maria, Calif., which produces petroleum products hauled throughout the west in rigs powered by Cummins diesel engines.



the barge. One mounts a 90-foot boom, the other

THE *MAGIC*

Marine Gathering Company's 260-foot self-contained barge marks beginning of era in offshore oil transportation . . .

By RUEL McDANIEL

THE lay barge *Magic* has completed its first pipe-laying contract with satisfaction and speed, marking the beginning of another major facet of the mushrooming offshore oil industry. It signals the beginning, because it was the first barge to be specifically constructed and outfitted for laying underwater oil pipelines. Its success on this first major job was the signal for start of other similar offshore barges also designed specifically for submarine pipeline work. Among the many

problems confronting the developers of the vast offshore oil resources from the start of operations was some practical and economical method by which the oil produced by offshore wells could be delivered to shore or to refineries.

That development in gathering and transporting offshore production was left behind until it was sorely needed is understandable, because the special problems confronted by exploration and production facets of the oil industry were tremendous and required concentrated thought and effort of the best minds of the vast petroleum industry. Logically, it was necessary to solve major production problems before concentrating on gathering and transportation. When the industry did get around to the problem of transporting oil from the deep wells of the Gulf of Mexico to shore, it was in a hurry as usual, and there was no time to wait for special equipment to lay pipelines on the bottom of the sea. Those charged with laying the lines followed the lead of exploration and production men and improvised with whatever floating equipment there was available to lay the first short lines under the Gulf.

As production moved farther and farther from shore, it was obvious that improvised equipment and methods could not economically continue to do the job of laying long lines at Gulf's bottom. And so a leader in gathering oil from offshore wells, Marine Gathering Company, a solely-owned

One of the two pedestal-mounted 35-ton Lorain cranes, powered with GM 471 diesel.

The lay barge *Magic* (right) starting to lay 12 in. pipeline at Conoco Block 47, Grand Isle area, Louisiana.

subsidiary of Commonwealth Oil Company, both of Houston, designed and constructed the *Magic*, the first barge to be built specifically for laying offshore pipelines. The company has other similar barges either under construction or about ready for service.

The *Magic* has completed a 28-mile line from a point about 25 miles in the Gulf of Mexico to pumping facility near the town of Grand Isle, Louisiana. Twenty-five miles of the job was the laying of a 12-in. pipe; the remaining three miles consisted of six and eight-inch pipe to form a small gathering unit into the farthermost point of the 12-in. main line. The job was done for the Catco Group, an operating corporation owned by four major oil companies.

The vessel, of steel construction, is 260 feet long, 50 ft wide and 13½ ft in depth. It contains a two-story superstructure at the bow, and a long ramp leads from the superstructure to deck-level at the stern. This ramp is the foundation for welding, coating, testing and launching the pipe into the continuous line being buried at the bottom of the sea. Movable rubber-tired dollies are set along the ramp to ease the pipe into the water as welds and patch-coating are completed. Welder stations, an X-ray station and a patch joint station are set at 40-foot intervals along the ramp, starting from the upper end, providing a smoothly-moving assembly-line type of operation. About eight minutes are required at each of the stops along the ramp.

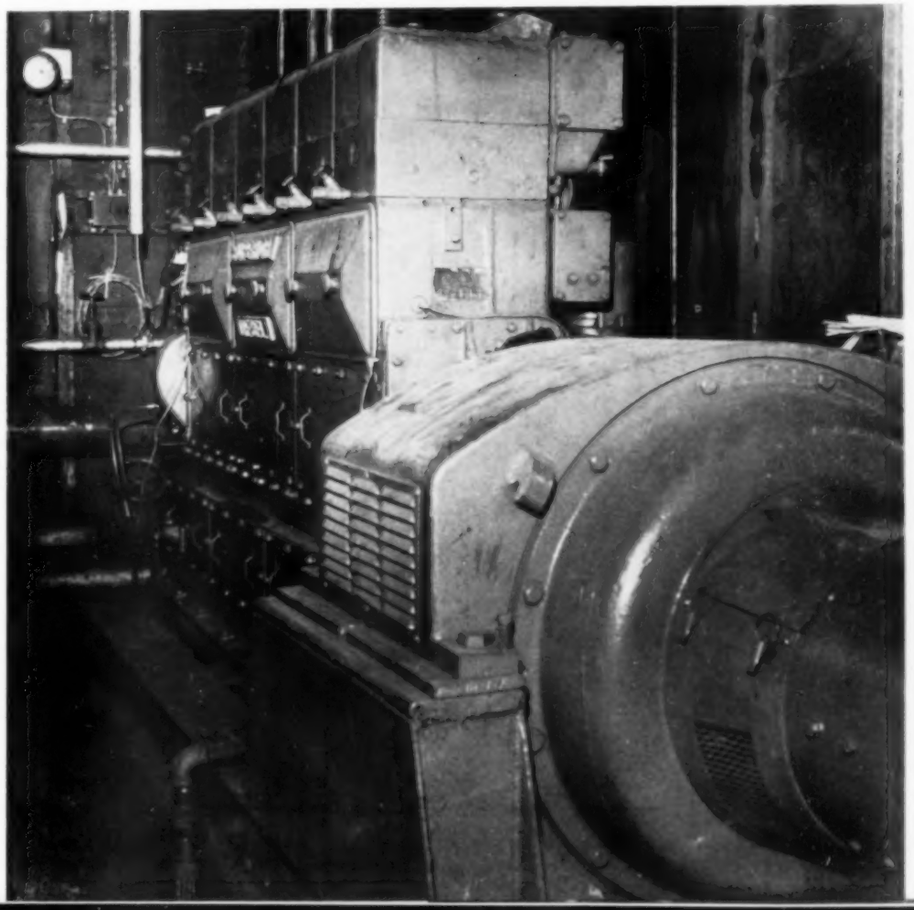
Two 35-ton Lorain cranes, mounted on caissons, are set slightly forward of midships on each side of the barge. One mounts a 90-foot boom, the other a boom 75 feet in length. The booms pick up the joints of pipe from a pipe-carrying barge alongside the *Magic*, swing them into position at the end of the welded section, then line them up for the stringer bead. A stiff-leg crane, mounted on the stern of the barge at deck level, aids in steadying the pipe and also is used for lower-in.

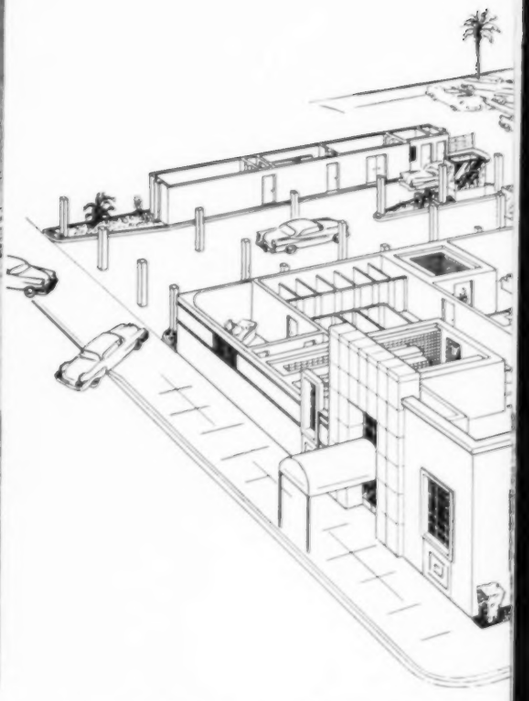
The pedestal-mounted cranes are powered by General Motors 471 diesel engines. The lay barge "bootstraps" along with a maximum of eight 4,000-lb Danforth anchors, operated from two four-drum winches located amidships on each side. Each drum holds 1,200 ft of 1⅛ in. line. A ballasting system permits the *Magic* to operate close in and in water as shallow as four ft, or at a maximum depth of eight ft for greater stability in deep water. Generating equipment includes 200 kw General Electric generators driven by Superior PTD-6 diesel engines. Also included in the equipment is one 40 kw Hercules diesel emergency generator.

Contained in the superstructure are air-conditioned quarters for 46 crewmen, a galley and offices. Housed under the upper area of the ramp are the following: X-ray darkroom, tool hut, shop and generating room.

President of Marine Gathering Company is G. Burton Liese; Robert C. Ledford is operating vice-president; L. E. Davis is superintendent of construction and operations, and M. I. McGowan is chief engineer. Captain W. C. Hanson has charge of the *Magic* in operation. Albert Cohen is pipe superintendent and T. O. May is assistant superintendent.

250 kw main generator, driven by Superior model PTD-6 diesel engine. This is one of two such units aboard the *Magic*.

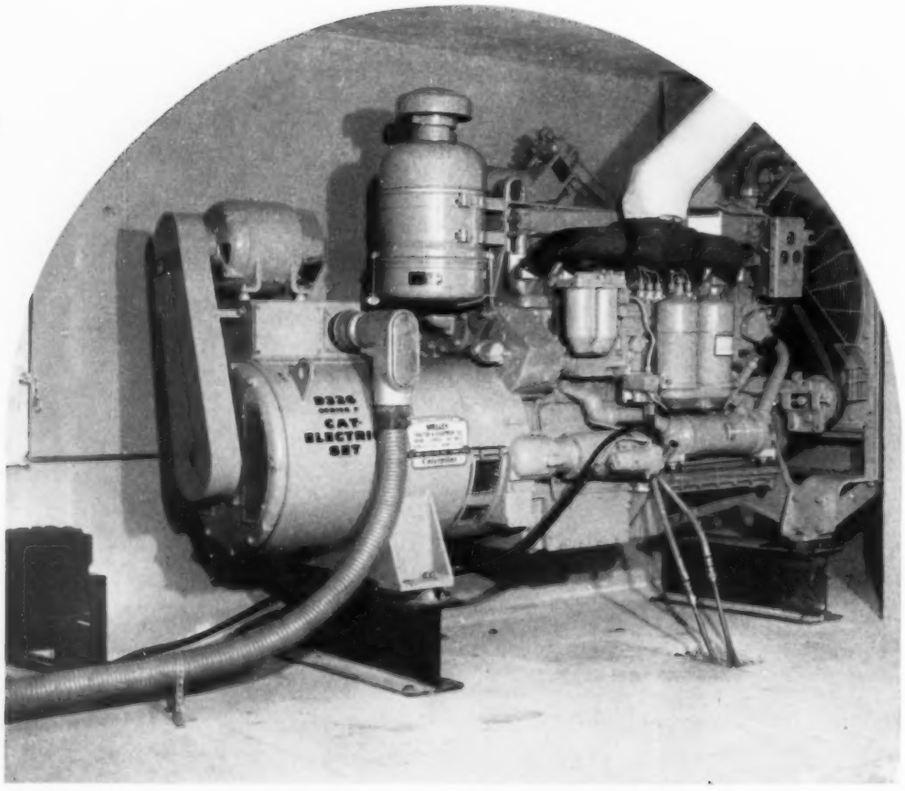




The new building of the First National Bank of Fort Lauderdale, Florida.

BANK IN THE SUN WITH A CAT

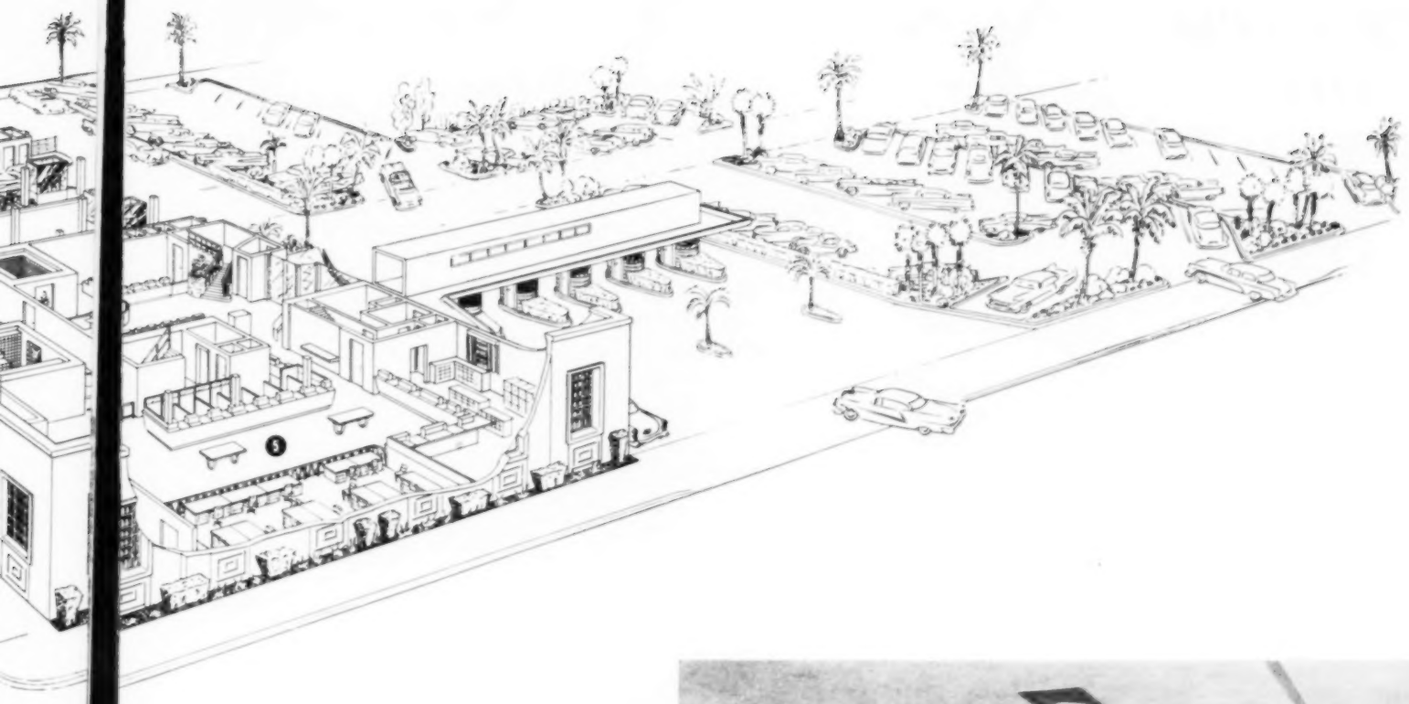
By ED DENNIS



FROM a down to earth economic view point, more and more business firms are learning the value of emergency dieselized generating sets. Such was the case of the First National Bank of Ft. Lauderdale, Florida when they selected a 100 kw Caterpillar diesel generating set to supply all the essential electrical power for its new bank building when the regular outside power fails. The fabulous Florida Gold Coast surrounds the City of Fort Lauderdale, a city of sunshine. The rapid growth of this area since the end of World War II, has resulted in a heavy demand on practically every type of business centered in the Fort Lauderdale area.

The First National Bank of Ft. Lauderdale, was founded in 1937, when the city's population was about 12,000 persons. In the beginning the bank had a staff of 6 employees and a depositors list of 76. And this bank, keeping up with the expansion of industry and increase in population, now has a staff of 203 and a depositors list of over 25,000. The City of Fort Lauderdale lies in the heart of the Gold Coast, 40 miles south of Palm Beach and 25 miles north of Miami. It's Bahia-Mar Yacht Basin is one of the largest on the eastern seaboard. The city, along with the deep water port of Port Everglades, has enough industrial and commercial activity, which added to its tourist trade, makes it a well balanced community of over 100,000 permanent residents.

Along with the new building program, the bank's officials decided to install an emergency standby generating plant. The diesel selected by the officials for this important phase of operation, was a



This Caterpillar diesel D326 Electric Set is used as standby power in case of a commercial power failure at the First National Bank in Fort Lauderdale, Florida. Will provide power for three floors of lighting and all machines used in banking.

model D326 series F 6 cyl Caterpillar diesel engine having a bore and stroke of 5⅛ in. by 6½ in. with a piston displacement of 805 cu in. and a horsepower rating of 155 at 1800 rpm. The diesel engine drives a self regulated 100 kw 3 phase, 60 cycle, 120/208 volt, 345 amp generator. This unit generates enough power to carry all the present essential lighting and building requirements including the passenger elevator. In effect, the Caterpillar diesel takes over the full job of the utility high line except the air conditioning system, for as long as the normal supply is off.

Some of the load that this generating set carries consists of 349 bulbs from 25 watts to 1000 watts, 5100 feet of fluorescent tubes, a passenger elevator, 4 magic carpet doors, 2 air compressors, three closed circuit T. V. sets, the telephone switchboard plus the various addressograph, I.B.M., electric typewriters and other banking machines. The Caterpillar generator unit is tested once each week for 15 minutes, to be certain it is always ready in the event of a commercial power failure, by the banks maintenance Supt. Mr. W. F. De Froscia.

When Shelley Tractor & Equipment Co. of Miami engineered and installed this generating unit they included a Ross H. C. E. oil cooler, to control the lubricating oil temperature; a Donaldson air cleaner; Trojan rectifier battery charger; two Southway 24 volt batteries; a Burgess-Manning STC#5 exhaust silencer and a Tampa Armature Co. switchboard. The #2 fuel oil comes from Belcher Oil Company and is stored in a 500 gal tank under a flower bed. The fuel oil filters are of the regular Caterpillar installation namely a two element paper type filter. The unit also uses the regular "Cat" lubricating oil filters.

AUTHOR'S NOTE—
From an economical point of view more and more Florida business firms are learning to depend on standby diesel units for emergency power in cases of regular electrical power failure and for use during peak load demand periods. However in some instances there will always be a George or Joe, who, because of their short sightedness or inability to cope with a power failure, will just sit in their swivel chairs behind their desks and see their firms lose thousands of dollars during these periodic power failures. These are the fellows that have to be convinced that "a dieselized standby generating unit pays off."

LITTLE INCH TO CARRY PETROLEUM PRODUCTS AGAIN

THE famous "Little Inch" pipeline is in the news again. Converted to carry natural gas after the war, the winding, undulating subterranean artificial channel that extends thousands of miles from Texas to industrial areas in the northeast sector of the nation, is being reconverted to a carrier of petroleum products. The much-publicized pipeline, which was hurriedly completed shortly after we entered the war, was purchased from the government by Texas Eastern Pipeline, Inc., after the cessation of hostilities. The Texas firm transformed the line to accommodate natural gas and it has continued to convey that type of fuel. One stretch of the new line, which will be composed of 16-in. pipe, extends from Schneider, Ind., just below Chicago, obliquely across the Hoosier state to Seymour, Ind., some 70 miles north of Louisville, Ky., a distance of 157 miles.

Horizontal Holes, Inc., is one of the firms working on this portion of the line. The Houston, Tex., firm specializes in boring holes under roads, railroads and other barriers which pipelines must penetrate. On the Schneider-to-Seymour project, Horizontal Holes will bore holes under 54 roads for "crossings." The firm is using a spread of equipment consisting of an Insley backhoe, a Crose boring machine, powered by an International U-4 engine, and an International Superior TD-14 sideboom, on this project.

The method used by the Houston firm to complete the borings follows: The Insley is used to dig the trench up to the edge of both sides of the road. The TD-14, in the meantime, is being used to assemble the sections of the "screw" of the boring unit and pushing it through the 20-in. casing. The boring machine is then attached to the assembled "screw." The backhoe and the TD-14 then team up to place the casing and boring machine in position in the trench. The Insley now serves as an anchor for the winch line that forces the boring machine into the hole. The TD-14 holds and guides the boring machine as it cuts its way to the target on the opposite roadside. After the bore is completed, the TD-14 pulls out the equipment, helps dismantle the "screw" and loads it for the trip to the next "crossing."

In addition to being a part of the boring team, the TD-14 also is used to clear the right-of-way, backfill and clean up where required. Borings must be made and casings inserted at all crossings, including country dirt roads. The reasons for this are that it has been found that traffic vibration weakens the pipe unless it is enclosed in a casing, and in case an explosion occurs at a point in the pipe under the roadway, the casing will direct the blast harmlessly to the roadsides.

After the boring machine completes its task, the TD-14 removes the unit from the trench. The sideboom then withdraws the "screw" from the casing, helps dismantle it and loads it for its journey to its next job.

After mounting the Crose boring machine on the borer, the TD-14, with the help of an Insley backhoe, whose boom and bucket can be seen here, positions the unit in the trench. The Insley also excavates the trench on each side of the roadway to prepare the way for the boring.

TURBOCHARGING THE FAIRBANKS-MORSE OPPOSED PISTON DIESEL

Bruce W. Wadman Visits Beloit To See New 3600 HP Turbocharged Two Cycle Engine.

BELOIT, WISCONSIN, Jan. 10—Today, I had the opportunity of viewing an engine development of great interest and importance at the Fairbanks-Morse plant here. Installed in their own power plant, which serves the entire electrical needs of the factory in Beloit, is F-M's entry into the field of turbocharged two cycle diesel engines. This 12 cylinder Opposed Piston diesel engine, in its brand new turbocharged version, is rated 3600 hp at 900 rpm. It's the same well known O-P diesel with bore of 8⅛ in. and stroke of 10 in. The engine is installed on the line and is carrying its share of the power plant load. The Fairbanks-Morse diesel generating plant took over the entire load of their factory in 1932 and has been producing all their power since then.

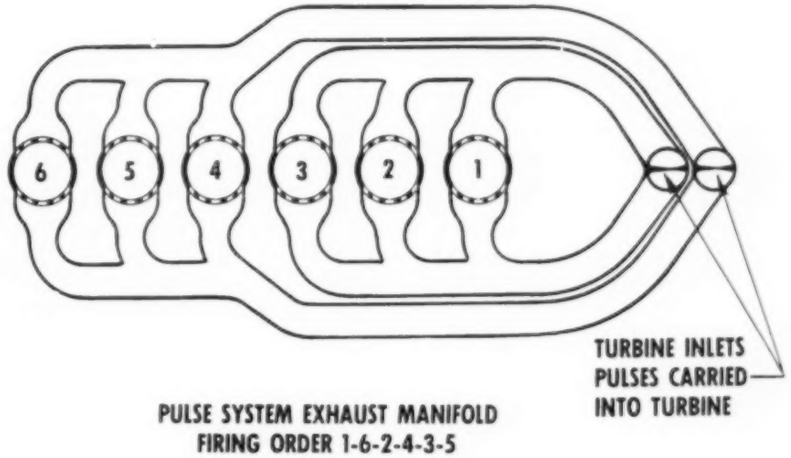
The engine was put through its paces for me, and the performance was impressive. It was shut down, started, picked up the load and was turning out 2700 kw in quick order. The compact power package for this healthy output and the overall smoothness of operation were features readily noted by this observer. You see new high output engines like this one turning out 50% more horsepower than before with better fuel economy and realize that the Diesel Industry has come a long way with a future as bright as we want to make it. Many unique design features are contained in the engine in such areas as the twin turbocharger installation based on the pulse system of operation, the auxiliary blower cutout which permits self-sustained operation with turbochargers from 40% load on up to full load, and substantially improved fuel economy to name a few.

The development of this newly turbocharged opposed piston diesel is a tribute to the thoroughness and cooperation of the Fairbanks-Morse Diesel Engineering Department at the Beloit Works, including Walther C. Fischer, Manager of Engineering; Anker K. Antonsen, Chief Engineer, Advanced Design Section; R. H. Beadle, Chief Engineer, Diesel Engineering; W. C. Arnold, Superintendent, Experimental Department, and their respective assistants and staffs. Mr. Antonsen is also to be thanked for providing the detailed description of major design features and specifications of the turbocharged O-P engine that appears below.

Technical Description

In their non-turbocharged form, these engines are extensively used in commercial, marine and stationary installations and in submarines and locomotives. The 6 cylinder and 12 cylinder configurations of this opposed piston engine are now offered equipped for turbo-turbocharging. The general design features of this turbocharged engine are basically the same as the non-turbocharged engine. In the turbocharged engine, the exhaust gases flow from the exhaust ports by way of divided manifolds through the gas turbine section of the turbocharger. By means of the turbocharger blower, atmospheric air is compressed to the required air receiver pressure. The scavenging air is cooled on its way from the turbocharger blower to the air receiver thus making available a more dense air charge for each combustion cycle. Two Elliott turbochargers and a Young intercooler are employed in the system. It is well known that on two cycle engines it is difficult to provide sufficient scavenging air with an exhaust turbocharger alone. On the other hand, the importance of the devel-

Figure 2—Diagram of pulse system exhaust mainfold arrangement in the turbocharged O-P engine.



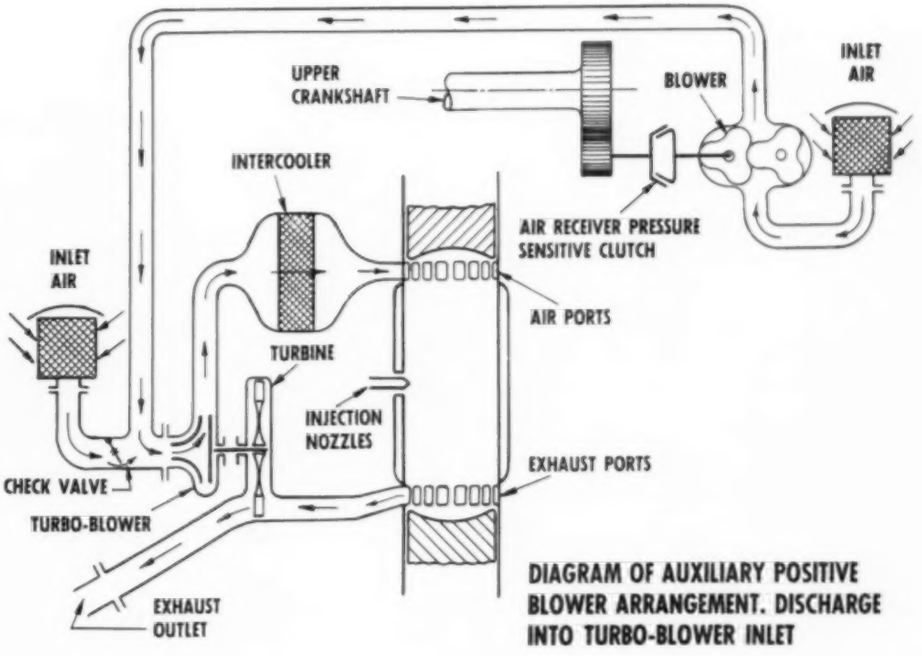


Figure 1—Diagram of auxiliary positive displacement blower arrangement and flow of intake and exhaust through the turbocharger system.

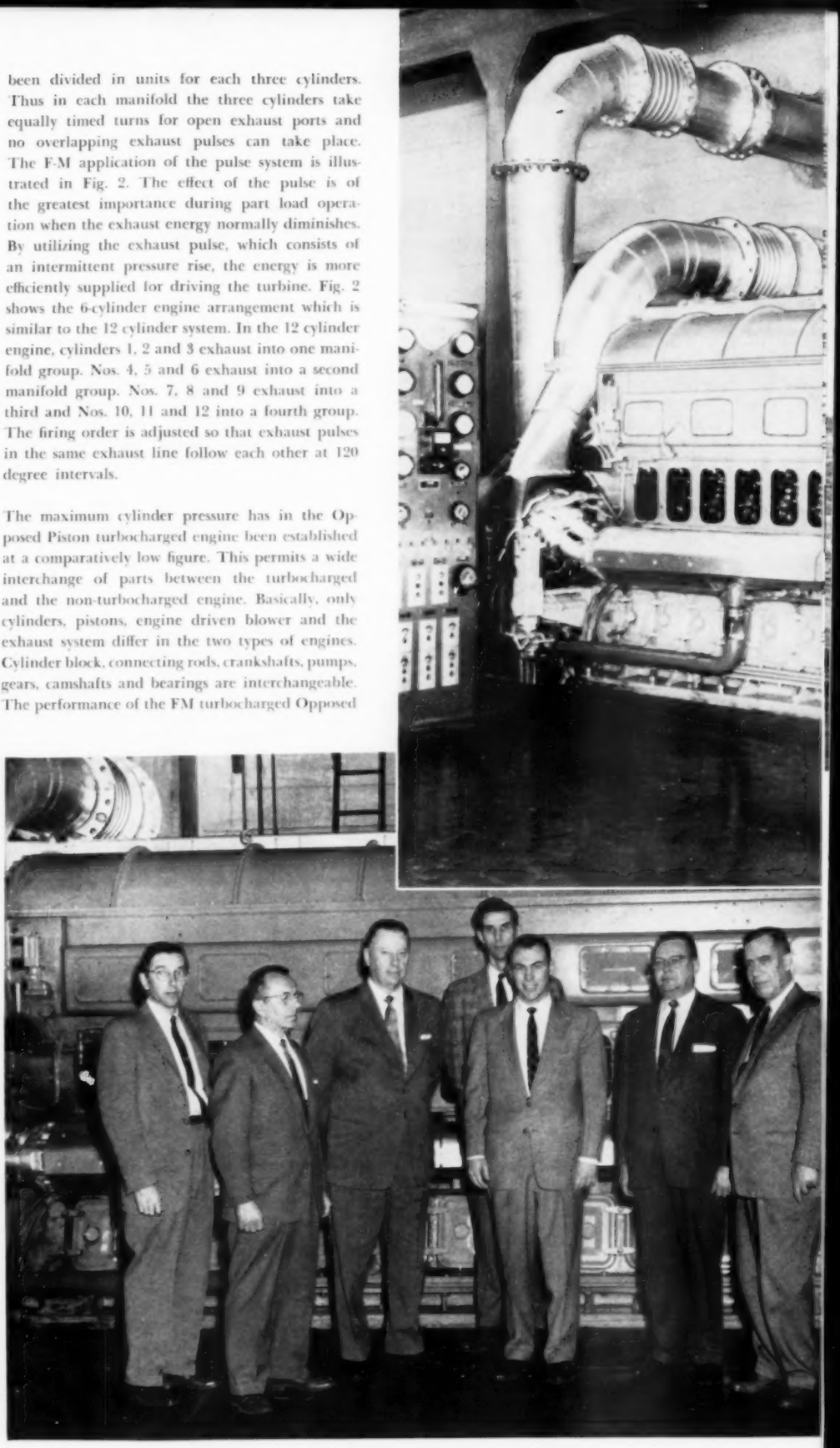
opment of a substantially self-sustaining turbocharged system was recognized by Fairbanks, Morse engineers as it provides for better fuel consumption and lower first cost than any other known system. Improvements in turbocharger efficiency, careful matching of the turbocharger and utilization of the pulse energy as well as the inherent good scavenging characteristics of the O-P engine have permitted application of a substantially self-sustained turbocharger system.

It is only below approximately one-third load that the exhaust energy which can be recovered in the turbine proves insufficient to supply an adequate quantity of scavenging air and a supplementary mechanically driven blower has to be brought into action. Thus, the mechanically driven blower becomes small and its power requirements are reduced accordingly. The arrangement of the engine driven positive displacement blower is illustrated in Fig. 1. After the engine is started and up to approximately 40% load on the engine, the supplementary blower supplies scavenging air to the engine. At this point it is automatically disengaged by means of a heavy duty tool machine type clutch. It remains at standstill at all higher loads and is only re-engaged if the engine load should drop below approximately 30%. The controlling element for engaging and disengaging the clutch is the air receiver pressure. Thus during starting when the air receiver pressure is nil, the clutch is positively engaged and a good supply of combustion air is available. Fig. 1 also illustrates the air flow as it has been incorporated within the self-contained arrangement on the engine. The auxiliary blower discharges into the suction of the turbocharger blower. A check valve prevents loss of this air to the atmosphere. This check valve automatically opens when the turbocharger blower begins pumping more air than is supplied by the auxiliary blower. The entire amount of air passes through an air cooler which is located on the engine above the air receiver.

The present development has been carried to a point where it is practical to apply the turbocharged version of the 8½ x 10 O-P engine at ratings with BMEP approximately 50% above the rating of the non-turbocharged engine presently offered. Thus the 12 cylinder engine becomes available in ratings up to 3600 hp at 900 rpm. At these ratings the usual 10% overload capacity is readily available. The specific fuel consumption is from 5 to 10% lower at full load operation and a great deal lower at part load operation as compared to the non-turbocharged engine. Actually, there is almost uniformly low fuel consumption from 50% load to overload. The proper utilization of the exhaust pulse energy, operation without auxiliary blower and the excellent scavenging characteristics inherent in the O-P engine, are largely responsible for these results.

The utilization of the exhaust pulse energy is explained as follows: During the early part of the exhaust process, when the gases enter the exhaust manifolds, a pulse is created by the blow-down energy. This pulse can exit only through the gas turbine wheel of the turbocharger thus creating an additional driving force. In order to prevent this pulse from entering other cylinders through open exhaust ports, the exhaust manifolds have been divided in units for each three cylinders. Thus in each manifold the three cylinders take equally timed turns for open exhaust ports and no overlapping exhaust pulses can take place. The F-M application of the pulse system is illustrated in Fig. 2. The effect of the pulse is of the greatest importance during part load operation when the exhaust energy normally diminishes. By utilizing the exhaust pulse, which consists of an intermittent pressure rise, the energy is more efficiently supplied for driving the turbine. Fig. 2 shows the 6-cylinder engine arrangement which is similar to the 12 cylinder system. In the 12 cylinder engine, cylinders 1, 2 and 3 exhaust into one manifold group. Nos. 4, 5 and 6 exhaust into a second manifold group. Nos. 7, 8 and 9 exhaust into a third and Nos. 10, 11 and 12 into a fourth group. The firing order is adjusted so that exhaust pulses in the same exhaust line follow each other at 120 degree intervals.

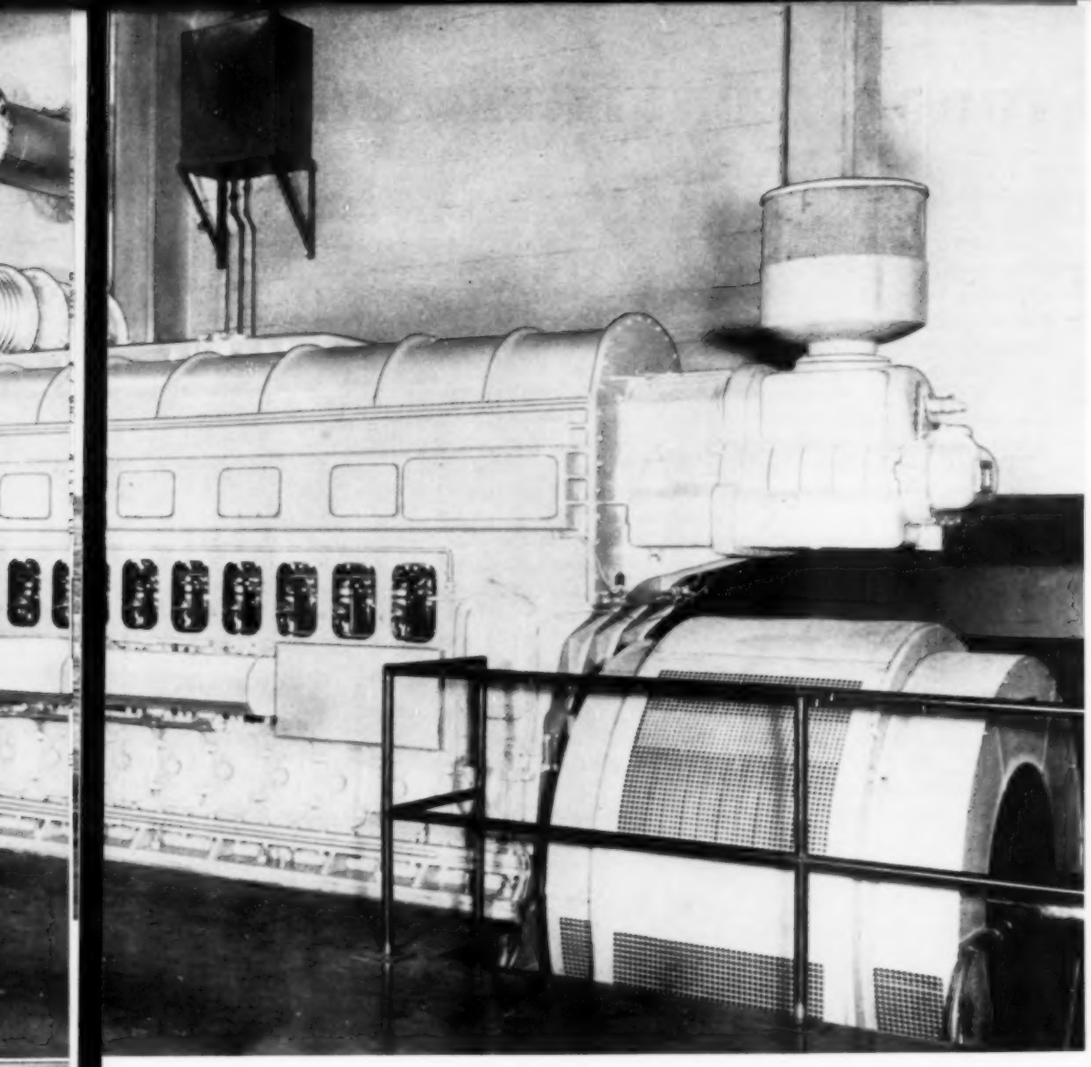
The maximum cylinder pressure has in the Opposed Piston turbocharged engine been established at a comparatively low figure. This permits a wide interchange of parts between the turbocharged and the non-turbocharged engine. Basically, only cylinders, pistons, engine driven blower and the exhaust system differ in the two types of engines. Cylinder block, connecting rods, crankshafts, pumps, gears, camshafts and bearings are interchangeable. The performance of the FM turbocharged Opposed



Left to right—R. H. Beadle, Chief Engineer Diesel Engineering—Anker K. Antonsen—Chief Engineer, Advanced Design Section—P. R. Flood, General Manager, Beloit Works, W. C. Arnold—Supt. Experimental Department, Bruce Wadman—Managing Editor DIESEL PROGRESS, C. E. Dietle—Manager of F-M Diesel Division, W. C. Fischer—Manager of F-M Engineering.

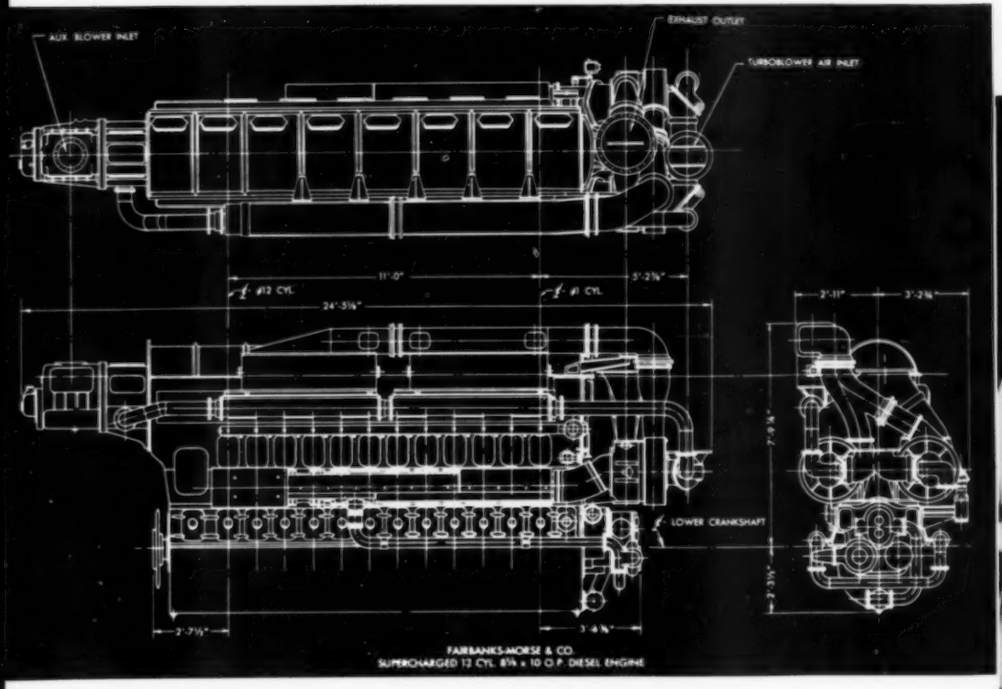
Piston engine was tested experimentally as early as the year 1945. Since the year 1952, a continuous concentrated effort was applied to make the engine suitable for commercial production in 1958. Turbocharged experimental engines have been in operation for a total of 20,000 hours. More than 10,000 operating hours can be credited to the 8 1/8 x 10 O-P engines. These operating hours include all experimental test work and numerous endurance tests which were carried out to determine the durability of engine parts. It has been established that the basic design of all stress components such as bearings, wrist pins, camshafts, etc. has ample reserve.

An additional feature of the turbocharged opposed piston engine is its low specific weight. The weight of the 6 cylinder basic engine is approximately 24,900 lbs (2100 lbs more than the non-turbocharged engine). The weight of the 12 cylinder basic engine is approximately 46,200 lbs (4000 lbs more than the non-turbocharged engine). It is also of interest to note that the cooling requirements are greatly reduced. It has been established that at the 50% higher output, the oil and water cooling requirements show almost no increase. The 12 cylinder 8 1/8 x 10 O-P engine is shown in outline in Fig. 3. The outline of the turbocharged engine compares in space requirements with the non-turbocharged engine to the extent that no change is needed in size of foundation and the installed space requirement is in general the same.

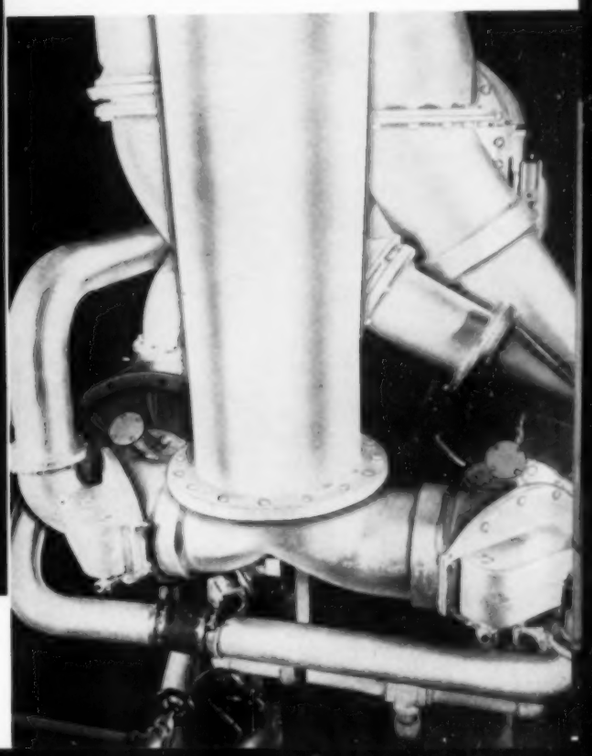


View of the 12 cylinder Turbocharged, 3600 hp Opposed Piston diesel installed in the FM power plant in Beloit. Note Elliott turbocharger with pulse system multiple inlets to the turbine from engine exhaust manifold at left and greatly reduced size of auxiliary blower at right.

Figure 3—Outline of the turbocharged 12 cylinder 8 1/8 x 10 opposed piston diesel.



End view of the twin Elliott turbocharger installation on the turbocharged O-P engine showing the piping arrangement for intake air and exhaust gases



FARM TRACTOR TORQUE CONVERTER DRIVE

J. I. CASE Company recently announced a new line of diesel farm tractors featuring the new Case-O-Matic Drive. This new transmission system features what is probably the first application of the torque converter to a production model diesel wheel type farm tractor. The Case-O-Matic Drive is the marriage of an efficient torque converter system design with a standard multiple geared transmission. In other words, it is a torque converter drive plus a conventional direct drive.

The torque converter is completely automatic within each working range as it instinctively senses an increasing load and automatically increases tractor pull power to match the load. The torque converter automatically adjusts tractor pulling power, therefore, to all load conditions and the direct drive feature provides maximum travel speed in any gear. The transmission system permits the farmer to select the proper gear, and then complete his job without shifting, stalling or using a clutch. The unit offers variable speed in every gear range with constant power to match each particular job.

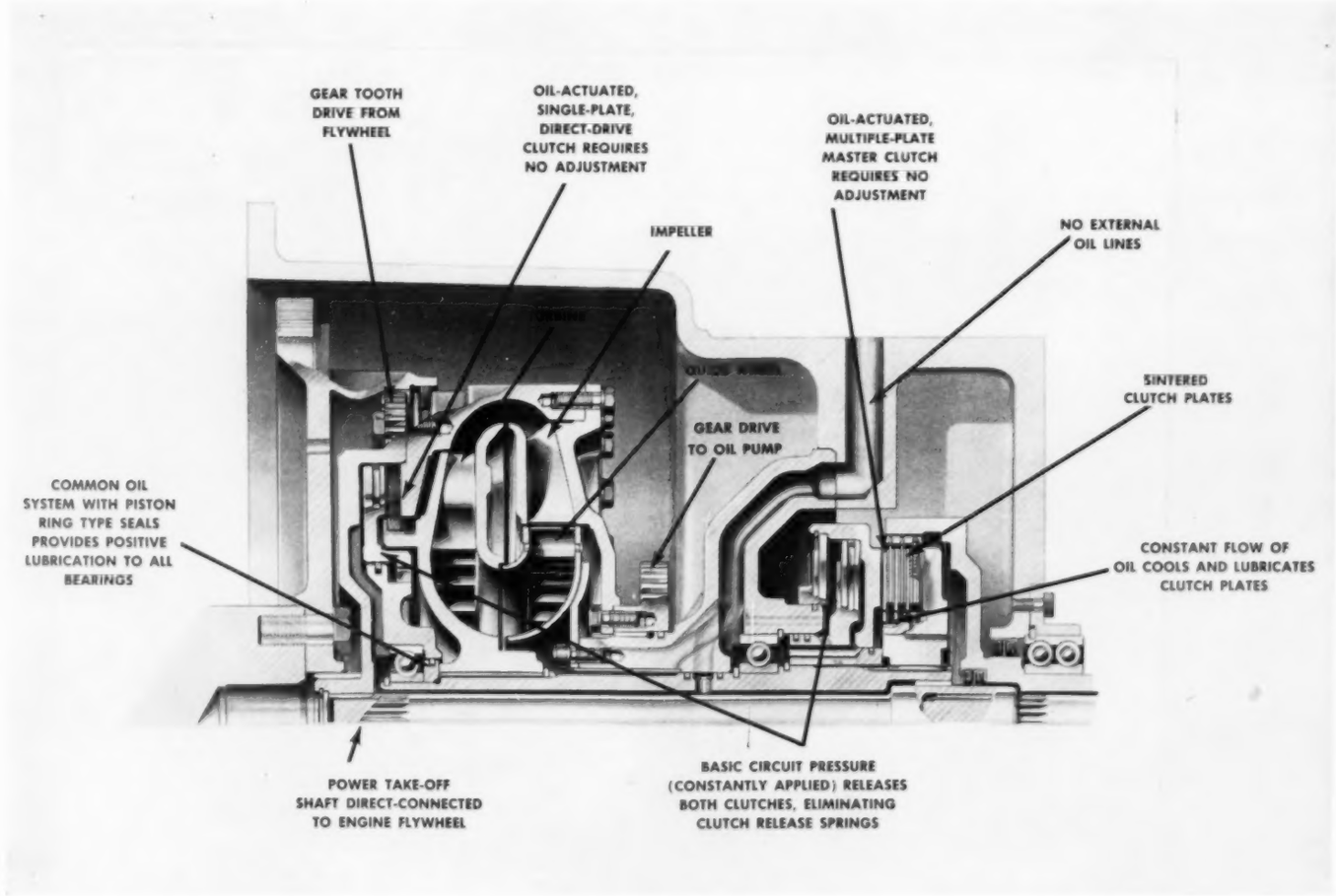
The new Case-O-Matic transmission system brings to the farm tractor field the advantages of torque converter drive that have been proven in so many diesel applications. These include an infinitely variable working range within the design limits of the converter, minimizing shock loading to driveline units thereby decreasing maintenance costs, eliminating engine stalling under load, and providing more drawbar pull when needed through torque multiplication. A great flexibility of operation is available in this new transmission system as the operator can operate either in or out of the torque converter drive merely by the flick of a lever at his fingertips. The new transmission is designed to achieve objectives such as speeding up work cycles, making operation easier and less tiring, cutting down maintenance costs, providing better tractor performance and more power output throughout the entire range of operation, and providing better control of the tractor.

The Case 800 diesel tractor illustrated here is a full five plow farm tractor powered with a four cylinder diesel. This Case diesel has a bore of 4⅛ in. and stroke of 5 in., a displacement of 267 cu in., and a rated speed of 1800 rpm. It has eight working ranges in the transmission system.

The single stage torque converter used in the Case-O-Matic Drive is manufactured by the Twin Disc Clutch Company. Contained in a spacer housing along with direct drive and master clutches, it is interposed between the engine and the following eight speed mechanical transmission. The Twin Disc Clutch Company, who introduced the industrial three stage torque converter to this country in 1936, decided to enter into single stage torque converter manufacture about a year ago.

This particular design is one of the more interesting variations of several designs they are currently offering the market. In order for a torque converter to provide operating advantages in farm tractors, it is necessary to include a direct drive "lock up" clutch which can be finger tip controlled by the operator at will. Of course, a clutch must also follow the converter in order that the mechanical gear box can be shifted. In this instance, a torque converter package was designed which incorporates all three elements, direct drive clutch, converter, and Master Clutch with only thirteen inches in over-all length in the instance of the J. I. Case Model 800 diesel tractor. In addition, this unit supplies a drive for an oil pump and an engine speed power take-off shaft.

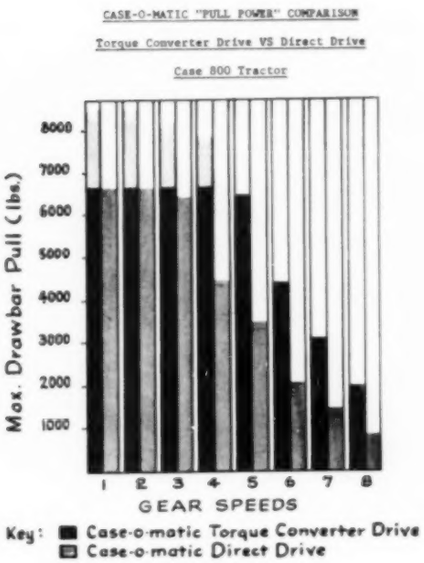
A unique feature of the design is the fact that both the direct drive and the master clutch do not incorporate release springs. Instead, the hy-


GEAR TOOTH DRIVE FROM FLYWHEEL
OIL-ACTUATED, SINGLE-PLATE, DIRECT-DRIVE CLUTCH REQUIRES NO ADJUSTMENT
OIL-ACTUATED, MULTIPLE-PLATE MASTER CLUTCH REQUIRES NO ADJUSTMENT
IMPELLER
NO EXTERNAL OIL LINES
SINTERED CLUTCH PLATES
GEAR DRIVE TO OIL PUMP
COMMON OIL SYSTEM WITH PISTON RING TYPE SEALS PROVIDES POSITIVE LUBRICATION TO ALL BEARINGS
CONSTANT FLOW OF OIL COOLS AND LUBRICATES CLUTCH PLATES
POWER TAKE-OFF SHAFT DIRECT-CONNECTED TO ENGINE FLYWHEEL
BASIC CIRCUIT PRESSURE (CONSTANTLY APPLIED) RELEASES BOTH CLUTCHES, ELIMINATING CLUTCH RELEASE SPRINGS

draulic clutches are engaged by double actuating pistons, one face of which is constantly acted upon by the basic converter circuit pressure of 40 psi. Separate valves to the direct drive and master clutches admit 140 psi high pressure oil, which overcomes the basic circuit pressure. Direct drive is obtained by "locking up" the impeller to the turbine wheel through the single molded asbestos driving plate. All bearings are supplied with pressure lubrication. Piston ring seals are used throughout except for the two double lip seals used at the rear of the unit. All leakage falls to the wet sump.

The direct clutch is actuated by a lever on the steering column. The master clutch valve is operated by a foot pedal on the left side of the tractor floor board. An interlock is provided which will not permit the direct drive clutch to be engaged unless the master clutch is engaged. This insures that both clutches are disengaged when starting the tractor.

The J. I. Case Model 400 and 600 tractors use a converter package almost identical in design except that the torque converter circuit is an eleven inch long unit instead of a thirteen inch long unit as used in the Model 800.



View of the Twin Disc torque converter drive system in the new Case-O-Matic transmission for farm tractors.

A full 5-plow tractor with Case-O-Matic Drive for big scale farming. Gives infinite travel speeds within each of its 8 working ranges . . . automatically adjusts power and speed to the load.

Propeller Shaft Forged Steel, 9¾ in. Dia.

TUG *JAMES J. VERSLUIS*

Versluis, Sturgeon Bay-Built Craft Powered by an Enterprise Diesel, Now Serves the Chicago Water Fund.

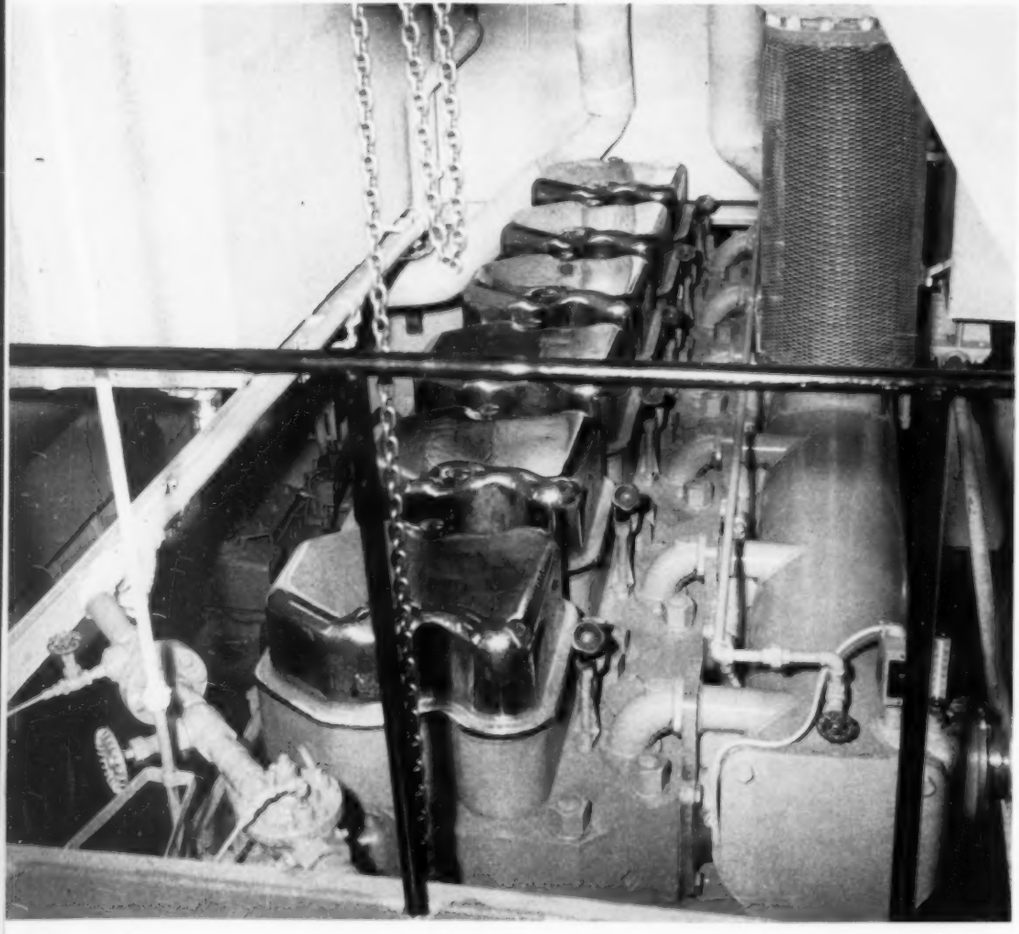
By BRUCE W. WADMAN

THE *James J. Versluis*, recently commissioned for service in Chicago waterways, is one of the most modern and versatile tugs built to date. Built for the City of Chicago, the vessel is being put to use on the Chicago River, the Calumet River, and Lake Michigan and is designed to serve several important functions. Primarily it will be used on waterworks construction projects by the city's Division of Construction, and will tow barges, and be used to transport the men who operate and maintain Chicago's lake front water supply cribs. However, it is also equipped to serve as a fireboat in case of emergencies, and is provided with a salvage pump to clear barges of water and pump out bridge pits. During the winter season it will see duty as an icebreaker. Additionaly, the vessel has been furnished with a special observation lounge which will comfortably accommodate as many as 25 passengers on waterfront inspection trips.

To make this unique 83 ft long tug even more interesting, it is reportedly the first tugboat on the Great Lakes to be equipped with the famous KaMeWa controllable pitch propeller, which permits the most precise maneuvers and full control of the vessel's direction and speed directly from the bridge. This propeller system is a Swedish development manufactured and marketed in the United States by A. Johnson and Company, Inc., New York. This 72 in. diameter propeller is driven through a 9⅞ in. diameter propeller shaft by an Enterprise, six cylinder, 800 hp diesel engine. Top speed of the *Versluis* is 15 mph and she carries a complement of two officers and three crewmen.

The year round versatility features of this new tug coupled with the diesel and controllable pitch propeller propulsion and control combination promise to make the *James J. Versluis* a standout performer

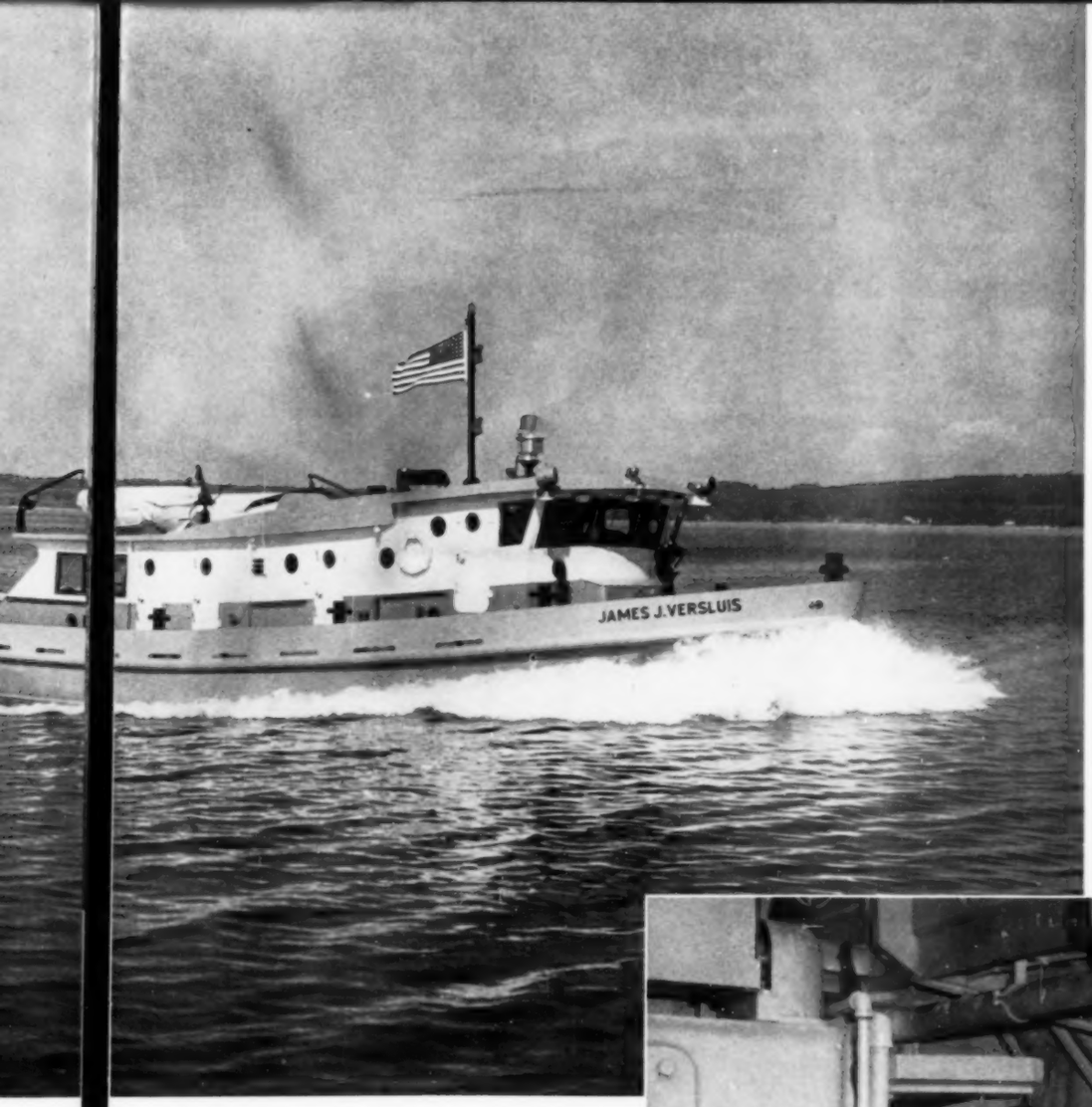
View of the main engine of the *James J. Versluis*, Enterprise 800 hp diesel, which is equipped with Winslow filters, Amot controls and Bendix fuel injectors.



for the City of Chicago for many years to come. Indeed, as the St. Lawrence Seaway reaches its full development and our Great Lakes ports grow, this tug may well prove to be a useful model for harbor tugs of the future that will serve our expanded Great Lakes ports.

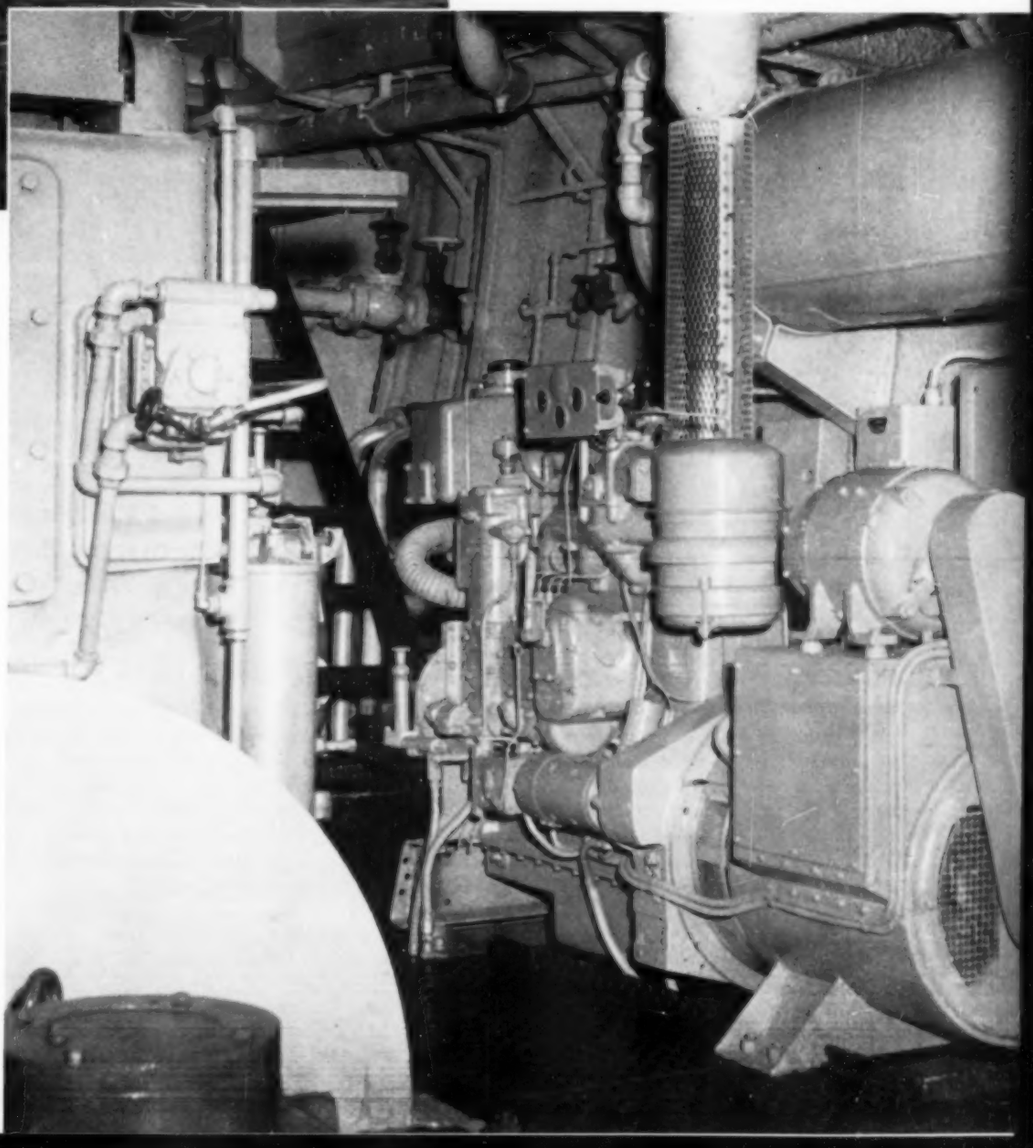
Another particularly noteworthy feature of the vessel is the considerable amount of electrical equipment it carries. To assure adequate and dependable electric power, the vessel is equipped with two Caterpillar D315 diesel generator sets, each producing 40 kw. These two main generators supply power to operate the steering gear, towing winch, anchor windlass, radar, ship-to-shore radio, intercom telephone system, firepump, salvage pump, two one mile ray 10 in. searchlights, and other auxiliary equipment.

The boat was designed by A. M. Deering and Son, Chicago Naval Architects, and was built in the well known shipyard of Sturgeon Bay Shipbuilding and Drydock Company. The *Versluis* is the fifth vessel to be built by the Sturgeon Bay yard in recent years for exclusive use in the Chicago area; the lastest is the *Harbor King*, a towboat for Chicago Towing Company just recently launched. The boat was named for James J. Versluis, Engineer of Water Works construction for the city of Chi-



Propeller Shaft	Forged Steel, 9⅞ in. Dia.
Propeller	KaMeWa Controllable Pitch, 72 in. Dia.
Steering Gear	No. 1 Sperry Electric
Main Generators	Caterpillar diesel 40 kw
Pilot House Engine Controls	Westinghouse
Pilot House Propeller Pitch Control	KaMeWa
Accommodations:	1 Observation Cabin, 1 Crew's Lounge
Towing Winch	Clyde, 10 hp Electric
Anchor Windlass	Ideal, 2 hp Electric
Lifeboats	Lane, 2 Six Person, Aluminum
Radar	RCA Model CR-103
Radio	Ill. Bell Telephone Co., Ship-to-Shore Telephone
Searchlights	2 One Mile Ray, 10 in. Dia.
Fire Pump	Fairbanks Morse 600 g.p.m.
Salvage Pump	Fairbanks Morse 450 g.p.m.
Air Compressors	2 Gardner-Denver
Intercom Telephone System	Hose McCann Co.

Engineroom view showing one of the Caterpillar D315 diesel generator sets rated at 40 kw. Two of these units supply all electric power on the vessel.



cago for 25 years. During his active career he established a remarkable reputation of success in connection with the many projects for which he was responsible. Chief among these are the construction of the Western Avenue Tunnel and Pumping Station, the Chicago Avenue Tunnel and Crib, the Thomas Jefferson and Cermak Pumping Station and the Stewart Avenue Tunnel. James J. Versluis is now retired.

Specifications for the tug are listed below.

Specifications

Motor Vessel *James J. Versluis*
Built by
Sturgeon Bay Shipbuilding & Drydock Co.

Length Overall	83 ft 0 in.
Beam	21 ft 1 in.
Depth Amidships	11 ft 0 in.
Draft, Normal Operating	9 ft 0 in.
Displacement	126 tons
Fuel Oil	12,000 gal.
Potable Water	1,200 gal.
Sanitary Water	1,200 gal.
Lube Oil	1,200 gal.
Main Engine	Enterprise diesel, 6 cyl., 800 hp

Cooper-Bessemer powered *Storis, Spar* and *Bramble* of the Coast Guard. Powered by Cooper-Bessemer type GN-8 diesel engines rated 700 hp at 700 rpm. These three vessels successfully charted the Northwest Passage last summer. The Coast Guard Cutters were a part of the Military Sea Transportation Service's 1957 Arctic Operations.

ACROSS THE ROOF

Three American Diesel Cutters Push The Probe of the Northwest Passage

By DOUGLAS SHEARING

WHEN the famed Coast Guard cutters *Storis, Spar* and *Bramble* broke into Atlantic waters this fall, they completed a most intense single search by the Navy's Military Sea Transportation Service. The long-planned search was for a new deep water route for supplying this country's extremely vital D.E.W. (Distant Early Warning) line in the Arctic Circle.

Sailing from Seattle last July, the three diesel-driven cutters began the Navy's probe to find possible escape routes for radar-line supply ships that could become trapped in the Artic by ice or by battle conditions. Since stations of the D.E.W. line are normally supplied by sea, enemy planes and submarines would obviously make any escape route through the Bering Sea too hazardous in addition to the ice packs themselves encountered in return passages to the Pacific.

From the original naval flotilla, three vessels, the *Storis, Spar,* and *Bramble* penetrated to the objective supply point. Designed for duty in the Greenland area, the *Storis,* a 230 ft cutter, had considerable ice breaking ability. The *Spar* and *Bramble* were constructed with an ice breaker bow for work in thin ice in harbors and rivers.

Advanced surveys of the Passage and ice conditions in the Passage from Ross Strait to Bellot Strait were made by plane. Until the vessels neared Bellot strait, it appeared that they might have to turn back to the Pacific. The Bellot Strait was con-

sidered the critical phase of the expedition where the long, elusive deep water route had to be chartered if a successful passage was to be opened up. For emergency, two U.S. ice breakers, Staten Island and Northwind, were called on to standby in the Point Barrow area.

The test probe is considered as dangerous a sea mission as has ever been attempted in modern times in a quest for the route "over the roof". From what was learned it has successfully determined where a channel may now be cleared and kept open for future supply convoys of the MSTS. Thus, a hope of seafaring men for over 500 years has been realized.

It was John Cabot who made the first attempt shortly after Columbus discovered America. He failed as did many others after him, and it was not until 1906 that the Norwegian explorer, Ronald Amundsen, found an Arctic passage after three years of wandering. The next ship to navigate a passage was a Royal Canadian Mounted Police patrol vessel, the *St. Roch*, that accomplished a passage from Vancouver, British Columbia to Halifax in 1941-43. The vessel returned in 1944. Since then the ice breaker *Labrador* has made passages through the territory in the endless exploration of circumnavigating the North American Continent.

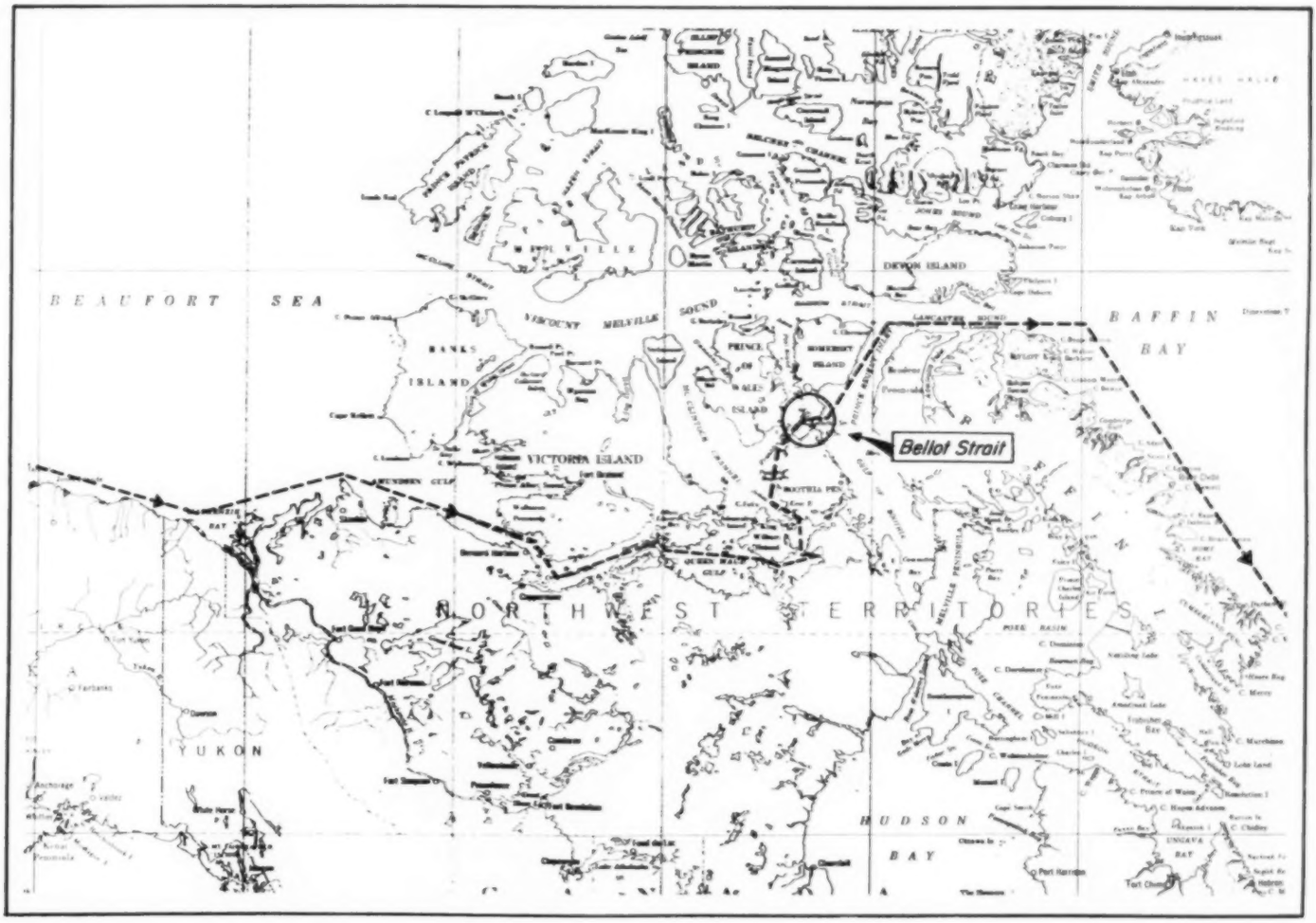
To the feat of the *Storia*, *Spar* and *Bramble* go International honors of a full scale peacetime mission fulfilled in its entirety as scheduled.

The very accomplishment under hazardous conditions is itself a tribute to the advanced engineering of modern-day marine designers and the builders who constructed the hulls. And to American industry that built the engines and propulsion goes the unacclaimed honors for a job well done in helping secure this continent's defenses. For through treacherous ice blows that were battled hour after hour, the demands on the engines were constantly full ahead or full astern often to maintain survival when winds and ice threatened to close the passage and stop the progress of the flotilla. The *Spar* was built in 1944 by the Marine Iron and Shipbuilding Company. This was the same year the *Bramble* was built by the Zenith Dredge Company.

All three vessels are powered by Cooper-Bessemer diesel engines type GN-8. The engines are rated 700 hp at 700 rpm. The *Storis*, the largest of the group, has three engines. The *Bramble* and *Spar* each have two engines. The engines drive generating sets for powering the propulsion machinery. The *Storis*, which operates regularly in Alaskan waters, has Kodiak, Alaska for its home port. The *Spar* is based at Bristol, R.I., the *Bramble* at Miami, Florida.

Route To Coast Guard Cutters Through Northwest Passage

This map shows the deep water "Northwest Passage" across the top of the North American continent, between the Pacific and the Atlantic, through which despite severe ice conditions the U. S. Coast Guard cutters *Storis*, *Bramble* and *Spar* have just made their way. No vessel under the United States flag ever before made the transit. The Canadian icebreaker *Labrador* escorted the cutters on a critical short cut through Bellot Strait (circle), a short, narrow channel between much larger waterways, seldom attempted by northwest passage explorers. With the exception of icebreakers, only shallow draft vessels—and few of these—had previously accomplished a northwest passage from ocean to ocean in 450 years of trying. The Coast Guard cutters made hydrographic surveys of their route as they went along. They were on a Navy mission to supply the DEW Line.



UTICA DIVISION OF CURTISS-WRIGHT TO MERCHANDISE AND LATER MANUFACTURE MERCEDES-BENZ DIESEL ENGINES

By JIM BROWN*

ACCORDING to officials of the Utica Division of the Curtiss-Wright Corporation, Utica-Bend will be engaged in full-scale merchandising and distribution of Mercedes-Benz diesel engines in this country in 1958 and sometime in the future expects to start manufacturing some of the most popular models of the engines in their plant near Utica, Michigan. This announcement comes as confirmation of what was hinted at in DIESEL PROGRESS in April 1957, when a fully detailed review of the Mercedes-Benz 600 hp model MB-837 Aa was published with the report that it "may be built here."

Mercedes-Benz engines are currently manufactured by Daimler-Benz Aktiengesellschaft of Stuttgart, Germany. There are 12 basic (naturally aspirated) models from 1 to 12 cylinders with 9 turbocharged and supercharged units based on one or the other of the basic models; 2 additional horizontal adaptations and one 20-cylinder "V" type 3000-hp marine engine which comes only in the supercharged version. The latter, incidentally, has the distinction of weighing only 3.54 lbs per max hp, including all accessories except fan.

As an isolated case, this accomplishment might seem as unimportant as a magician's trick, but the performance is given more credibility by a review of the other achievements of the manufacturer in this direction. We made some quick slip-stick calculations and found other Mercedes-Benz engines of 5, 5.6, 6.1, 6.6 and 6.75 pounds per horsepower respectively, which fact may raise some eyebrows.

Of course turbocharging (which enters into this) is knocking the socks off of former lb/bhp figures for most diesel manufacturers but you have to have a pretty compact, well designed light-weight engine to begin with to get down into this range, even with turbocharging.

Of the 24 current models of Mercedes-Benz engines mentioned above, Utica Division will concentrate their immediate efforts on the sale of about 20 models between the 2-cylinder 55 bhp at 1200 rpm model M 202 B and the 12-cylinder V-type, 1350 bhp at 1500 rpm turbocharged-with-intercooling model MB 820 Db. As can be seen by the accompanying chart, the selection of engines they will offer covers quite a range of horsepower.

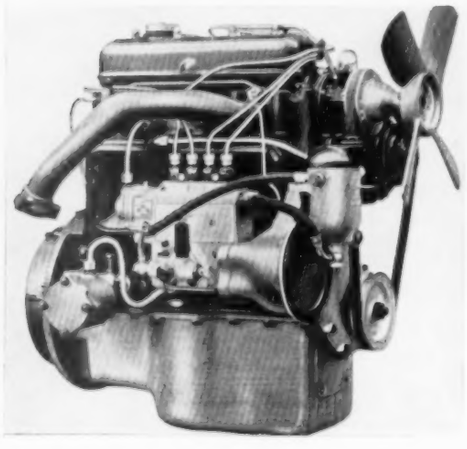
Mercedes-Benz diesel engines are claimed by the manufacturer to have a lineage going back to "the first high-speed diesel" which powered a Daimler truck in Gaggenau in 1924. They are all of the 4-stroke cycle, all have Robert Bosch injection pumps and nozzles, Bosch electrical starting. All of the larger engines have wet-type replaceable cylinder liners. Chief design feature given credit for economy and smoothness of combustion is a patented pre-combustion chamber located between the fuel nozzle and the cylinder. This pre-combustion chamber stores the igniting fuel injection and feeds the expanding gases into the cylinder, smoothing out the power impulses and increasing fuel economy. Each pre-combustion chamber also includes a glow-plug to facilitate starting and engine warm-up. All of the Mercedes-Benz engines are pressure-lubricated and have thermostatic temperature control. Although ruggedly constructed, light weight is achieved by extensive use of light metal alloys.

Mercedes-Benz diesel engines appear to be uniformly economical in operation; have "continuous"

The Mercedes-Benz MB 837A is a compact V-8 power plant of 450 bhp at 2000 rpm offered in either heat-exchanger or radiator cooled models for marine or industrial use. The same basic engine with supercharging (MB 837Aa) produces 600 bhp at 2200 rpm for truck use and weighs only 5 lb per bhp.

*Midwest DIESEL PROGRESS Editor

Mercedes-Benz OM 636 automotive diesel, rated at from 19 to 46 bhp and only 25⅞" long from fan to face of flywheel housing.



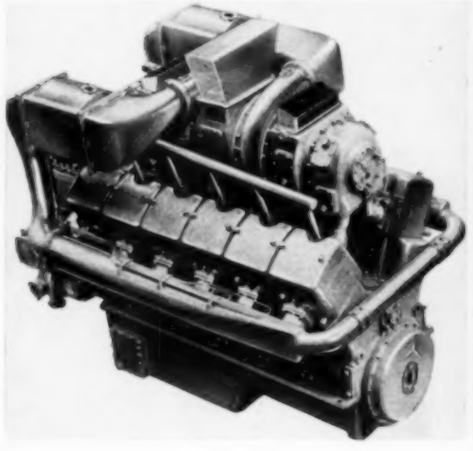
rating specific fuel consumption curves in the .35 to .40 lbs/bhp/hr range on several models although a few of the lower horsepower models show a consumption of .45 to .50 lbs/bhp/hr.

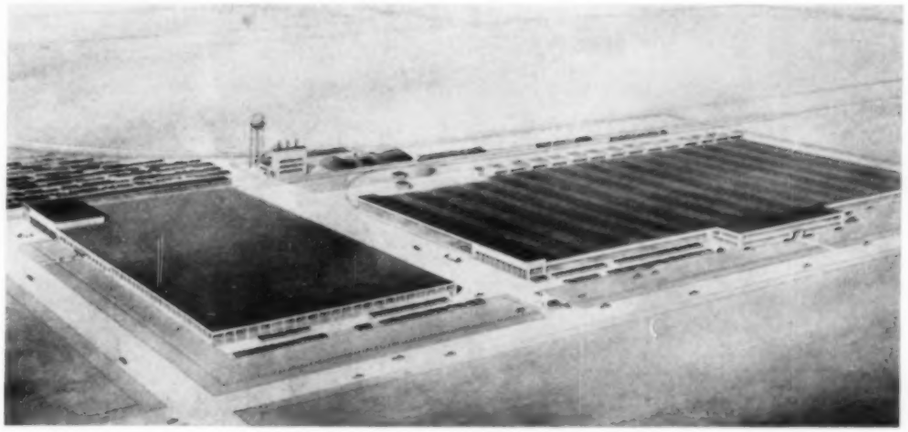
When we speak of "automotive" diesel engines in this country the term is used very loosely. It generally means "the kind of diesels that might conceivably be put into automobiles, if we wanted diesel automobiles." In Germany and elsewhere on the continent, the term "automotive" means just that, and Mercedes-Benz diesels by the thousands are employed to power pleasure cars, taxis, buses, light trucks, heavy trucks and rail cars—just about everything on wheels. At Utica Div. we were privileged to inspect and to hear operated the OM 636 automotive engine which is a little 4-cylinder engine rated for industrial use at 36 bhp at 3000 rpm. For automotive use it is rated at 46 bhp at 3500 rpm. With bore and stroke of only $2\frac{1}{16}$" by $3\frac{1}{16}$", fan-to-flywheel length of only $25\frac{7}{8}$", height of $31\frac{1}{2}$" from bottom of breather tube to top of air cleaner and weighing only 440 lbs (dry) with standard accessories, the OM 636 suggests many possible applications such as small wheeled tractors and lift trucks.

Similar small "automotive" diesels in the Mercedes-Benz line are the 110 bhp OM 312, the 120 bhp OM 321, the 127 bhp OM 315, and 220 bhp OM 326, all of which are 6-cylinder engines. Besides wide automotive and truck application experience, the manufacturers of the Mercedes-Benz engines are also well acquainted with the requirements of the marine field, construction, oil-well drilling and electric power generation.

We asked H. C. Clark, Sales Manager of Utica Div. what he believed the salient sales features of Mercedes-Benz engines in this country would be. "Many things" replied Mr. Clark, "Including economy of operation, low weight to horsepower and wide range of models suited to many different kinds of equipment. These engines have a finish to them that denotes master craftsmanship and they are competitively priced."

One of the larger Mercedes-Benz V-type engines is the MB 820 Db V-12 with heavy-duty supercharger and intake air intercooler. This engine, suitable for oil-well drilling, railroad locomotives or heavy marine use produces 1350 bhp at 1500 rpm, weighs 5.01 lbs per bhp as shown.





The Utica Division of the Curtiss-Wright Corporation, where Mercedes-Benz diesel engines will be manufactured for sale in this country.

Mr. Clark went on to say that Utica Div. is building up a distribution organization of direct factory dealers, with a goal of 100 or more marine and industrial dealers in the country. They expect to have about 6 regional sales and service offices and 4 or more parts warehouses. During 1958 the engines will gradually be converted to the use of domestic accessories which will simplify parts procurement and service training problems. American-made Paragon and Capitol reverse and reduction gears are furnished for marine applications.

Besides the main plant, the Utica Division has also taken over some nearby shops and a proving ground. The proving ground shops include several engine test bays with dynamometers and research equipment. Here also is a single cylinder research engine which is being used in experimental work and in connection with a government contract involving a lightweight marine diesel, the production of which has been taken over by the Utica Division.

MERCEDES-BENZ ENGINES TO BE SOLD BY UTICA DIVISION
Industrial Ratings

MODEL NO.	NO. CYL.	Cu. In. Displacement	Intermittant bhp @ rpm	Continuous bhp @ rpm
OM 636	4	108	36 @ 3000	33 @ 3000
OM 315	6	505	127 @ 1800	115 @ 1800
OM 326	6	628	220 @ 2200	200 @ 2200
OM 312	6	280	79 @ 2400	72 @ 2400
OM 321	6	311	96 @ 2600	87 @ 2600
M 204 B	4	789	129 @ 1200	118 @ 1200
MB 846 A	6	1230	242 @ 1500	220 @ 1500
MB 846 B	horiz. 6	1230	242 @ 1500	220 @ 1500
MB 846 Ab*	6	1230	320 @ 1500	292 @ 1500
MB 846 Bb*	horiz. 6	1230	320 @ 1500	292 @ 1500
MB 846 Db**	6	1230	375 @ 1500	350 @ 1500
MB 836 B	6	1806	360 @ 1500	322 @ 1500
MB 836 Bb*	6	1806	513 @ 1500	445 @ 1500
MB 836 Db**	6	1806	666 @ 1500	555 @ 1500
MB 837 A	V-8	1823	451 @ 2000	400 @ 1800
MB 837 Aa*	V-8	1823	564 @ 2000	515 @ 1800
MB 820 B	V-12	3613	718 @ 1500	650 @ 1500
MB 820 Bb*	V-12	3613	1026 @ 1500	890 @ 1500
MB 820 Db**	V-12	3613	1385 @ 1500	1180 @ 1500

* Supercharged ** with Supercharging and inter-cooling

SPECIAL SERVICE TOOLS FOR DIESELS

Excerpts From A Paper Given By A. E. Price, Vice President of Kent-Moore Organization, Inc. On the Economics of the Use of Special Service Tools In Large Diesel Operations.

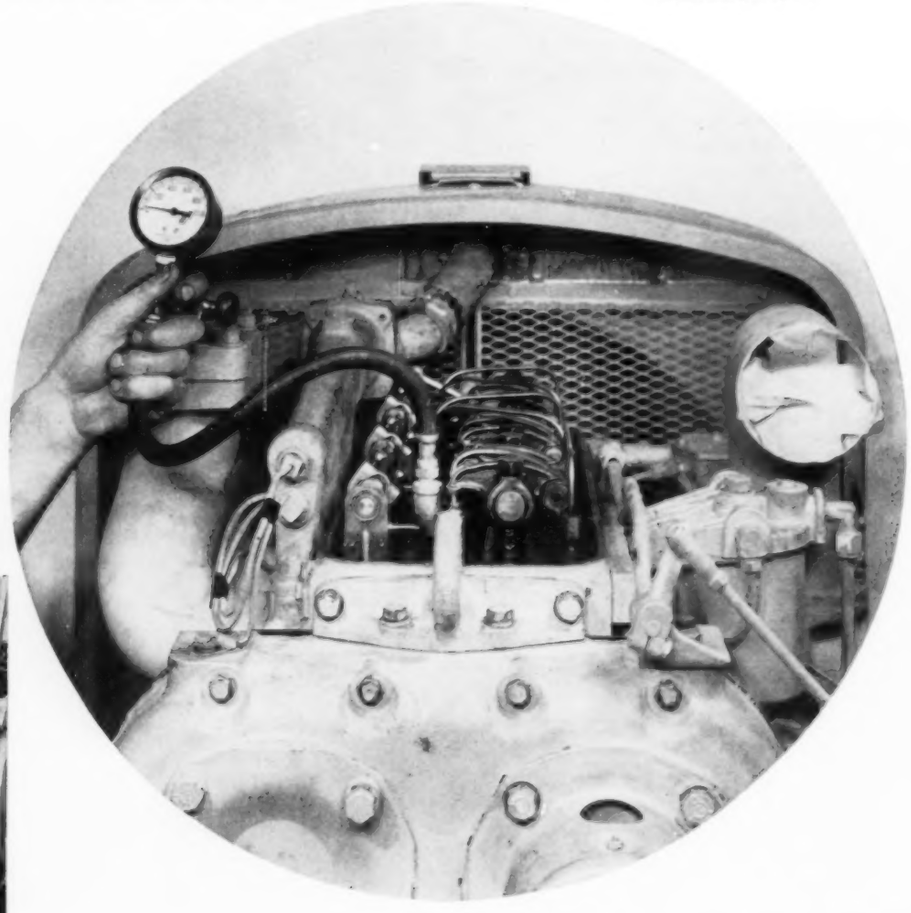
WHAT is a special service tool? It is a tool that is not customarily available through commercial tool outlets such as supply mechanics' hand tools, universal type pullers, pushers, etc. It is very seldom that special tools appear in the category of equipment items, but sometimes adapters are necessary which are classed as special, but made to operate with such units. In most cases a special tool is provided as a single-purpose item to quickly perform an operation which comes up frequently. A guiding factor in this regard is whether or not the frequency of use warrants the purchase of the item by the user. In other words, a real special tool in the full meaning of the word will pay its cost the first few times it is used. Special tools should be a part of the facilities provided in every instance where mechanical devices of varying degrees of complexity need to be adjusted and maintained to their maximum operating efficiency. With trained man power, using a known procedure and known facilities, a fair time in which to perform any service operation may be readily determined. With this knowledge, it is possible to not only establish the fair rate of charge, but also to be able to schedule work through a service department with very great accuracy. In the case of motor truck maintenance, the matter of downtime and the cost of operation per ton mile is exceedingly important and has a great deal to do with the yearly profits of a fleet operation or municipal transit authority.

There are a number of factors which decide originally whether or not a special tool is desirable or necessary and an analysis must satisfy the following questions: Is the tool necessary in order to conform with factory installation procedures and prevent damage to components of the engine? Is the frequency of use sufficient to warrant its production? Will use of a special tool tend to reduce maintenance costs and thereby increase profits? Can the work be satisfactorily performed with existing mechanics' hand tools and in the length of time which should be reasonably allotted to that type of operation? No item can be classed as an Essential Special Tool unless it can satisfy the above questions. Once having established the necessity in consultation with diesel manufacturers etc., the actual development of a special tool begins. The prototype tool upon approval, becomes the subject of a time study to determine whether or not it provides the fastest and safest means of performing a given operation and, having satisfied that requirement, the tool becomes a part of the maintenance manual procedure established by the engine builders. Naturally, no engine builder will classify a special tool as essential unless it can be demonstrated without a doubt that it will allow a given operation or operations to be performed at less cost and greater efficiency than by any other means.

The need and the type of special tools is usually determined before a new engine or a new component of the engine is released for sale to the public. Before the engine dealer knows what the unit is going to look like, the service and production engineers of the builder have a pretty good idea through thousands of hours of testing as to where normal wear and fatigue failures are liable to occur. From this knowledge has evolved the well accepted principle of *Preventive Maintenance*. It is assumed that the dealer who sells the product must be in a position to perform service operations for every conceivable failure without having to ask the owner of the engine to wait days, weeks, or even months until a special tool can be devised or procured to perform the operation necessitated by the product failure. Up to the present time, the system which has operated so efficiently in retail establishments of the successful engine builders has largely been ignored by many fleets who should have even more of an incentive to place service tools in operation than the average dealer.

Another reason why fleets should be interested in special tools developed with the assistance and the approval of the engine builder, is that in numerous instances, reconditioning operations can be performed on units at a considerable saving in actual dollars. A dealer or an independent service station can sometimes make more money by selling

Kent-Moore Cylinder Compression Gauge measures pressure from 0 to 1,000 lbs per sq in.



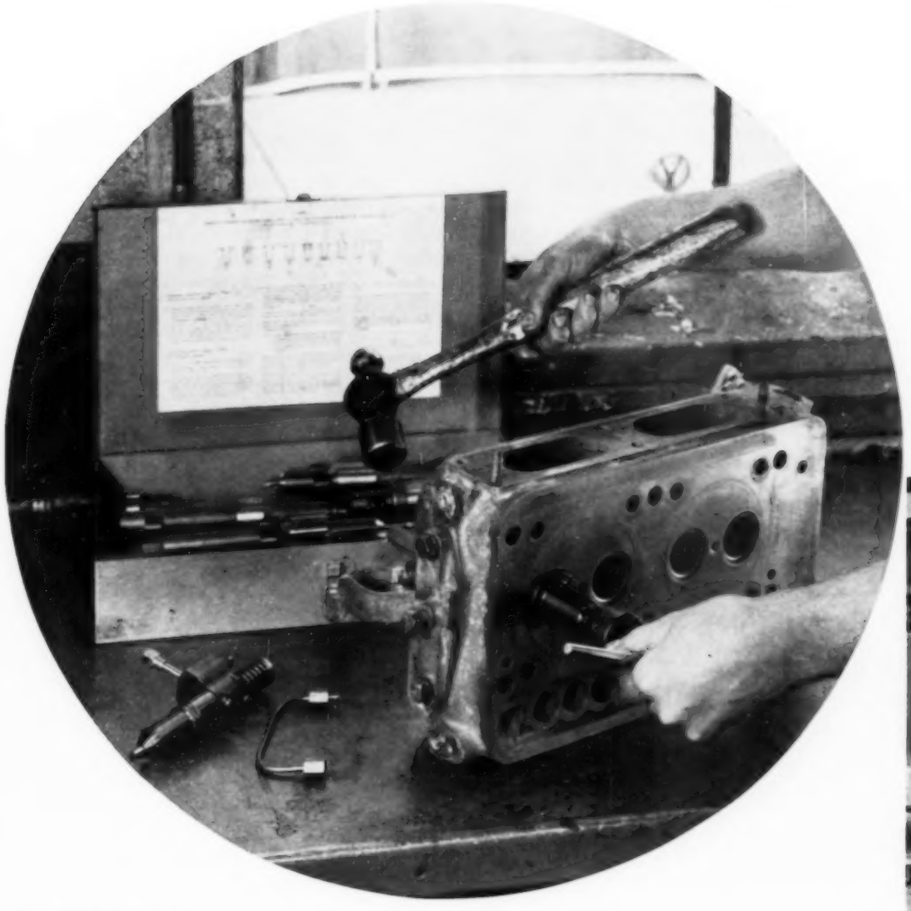
GM diesel being tested with a Kent-Moore Basic Diagnosis Test Kit, which makes possible quick and accurate trouble shooting in the shop or out in the field.

a complete new unit and junking the defective assembly. Considered here is the matter of junking fuel pumps, lube pumps, water pumps and other items which could be overhauled and the major parts of the mechanism saved by applying a small amount of time and the replacement parts that are available through the manufacturers' parts stock. A well-equipped fleet service station operating on its own money will save many dollars in a period of one year by buying replacement shafts, bushings, bearings, oil seals, impellers, etc., rather than ending up with barrels full of repairable but junked accessories. It is well to point out again that special tools in a shop, when properly used, will accomplish exactly the same savings that they do in the repair shops of dealers of successful engine builders today, as follows: (a) They allow repairs to be made in a workmanlike manner. (b) They allow repairs to be made in a reasonable time and at low cost. (c) They reduce excessive down-time and comebacks. (d) They allow proper scheduling and the best possible use of the limited supply of skilled man power.

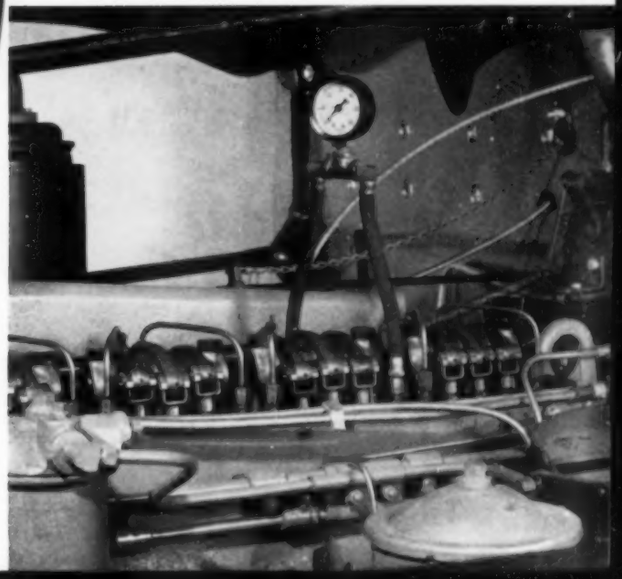
The experience in many commercial shops has been that the dealer who offers the best tool aids for his skilled mechanics to use, has far less labor turnover and a much better customer acceptance of work performed. In providing such tools the drudgery of service work can largely be eliminated; the job can be turned over to the customer with confidence that it has been done properly. In a fleet operation the savings can be impressive. Unfortunately, unless a rebuilt engine or unit is placed on a dynamometer or other break-down test, there is no means of determining whether a complete overhaul has been successful or not. The proof of the pudding is in the length of time it will run before another failure occurs. It is not claimed that special tools will cure every mechanical defect nor that they will teach incompetent mechanics to do a good job. However, with the proper special tools even an average mechanic can do a tremendously better job than he could if he had nothing to depend upon except wrenches, screw drivers, sockets and pliers which are a part of his personal tool box equipment. Manifestly, mechanics cannot be expected to buy special tools. Such tools are the responsibility of the vehicle dealer and/or the fleet owner, individual owner or transit authority interested in the most economical adjustment and rebuild of a given unit.

The value of preventive maintenance equipment cannot be too strongly emphasized. It is the aim of the engine builders to place in the hands of each authorized dealer a complete set of the more essential tools which could conceivably be needed for almost any type of failure that might occur on any engine in his territory. The preventive maintenance principle should be even more important in fleet operations because in most instances such haulers are governed by fixed rates and the yearly profit is determined to a great extent by the cost of vehicle operation. In heavy diesel powered tractors in which the engine is expected to run around the clock, the lack of the proper tools could oftentimes create more loss in excessive down-time than the entire set of tools cost originally. The economical usage of special service tools is a subject that deserves careful consideration on the part of diesel fleet owners of all types who maintain their own service facilities.

Standing from left to right, Charles Rossow, Sales Manager, Clarke F. Andreae, General Manager, and Joe Lackey, Service Manager of Peninsular Diesel, Inc., Detroit Diesel Engine Div. of GM distributor in the Detroit, Mich. area. Their feelings on good service procedures are as follows: Mr. Andreae—"Good service is just good business for a Diesel Distributor—And good service means using factory recommended tools and procedures to meet rigid factory specifications." Mr. Rossow—"More and more, every day, proper service and service facilities play an important part in diesel sales." Mr. Lackey—"I couldn't run my service department without the proper tools as recommended by the engine manufacturer."



Reaming a valve seat with a special Kent-Moore injector tube service tool set.



Fuel Pressure Checking Gauge installed on a diesel truck engine provides a fast, accurate means of checking fuel pressure.

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

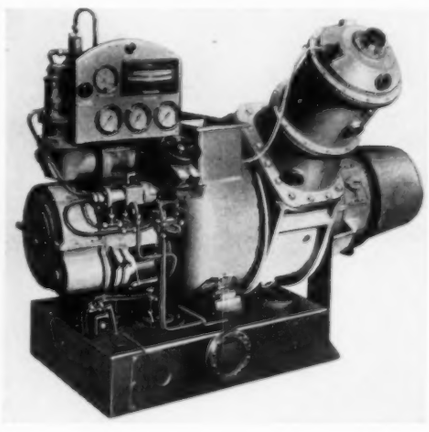
Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now specializing in industrial advertising with Roles & Parker, Ltd. in London.

A New Ruston Gas Turbine

RUSTON and Hornsby Ltd. of Lincoln have already achieved considerable success with their 900 kw Mark TA type gas turbine and over 60 of these machines are in operation or are on order. This is the unit for which Clark Bros. Co. hold a licence. Rustons have now extended their range to include a smaller 300 kw turbine which, in common with the larger design, is of extremely light weight, and small bulk, and should particularly attract the attention of engineers in oil and natural gas fields throughout the world. The new gas turbine is known as the type TE and is an open cycle, single shaft machine with centrifugal compressor and three-stage axial turbine which develops 430 bhp (at 80°F) for continuous rating. The turbine and compressor are mounted at opposite ends of a common shaft which is extended forward from the compressor to provide a drive to the David Brown gearbox. The latter is rigidly attached to the forward end of the engine and governor and accessory drives are taken from it through suitable gearing. The combustion chamber is mounted at right angles to the engine axis just off the vertical position. The rotor speed of 19,250 rpm is reduced to an output shaft speed of either 1200 rpm or 1500 rpm, but reduction gears for other outputs to suit various driven components can be fitted.

A comprehensive air cooling system is fed from the compressor and the set is thus rendered immune from damage from rapid starting and shut down. The compressor is a single stage unshrouded centrifugal design giving 3.5 to 1 pressure ratio. Both the impeller and separate inducer are manufactured from high tensile alloy steel or, alternatively, high strength Martensitic stainless steel where corrosion service conditions are expected as, for example, in marine applications. The three-stage axial flow turbine has unshrouded Nimonic 90 blades designed for equilibrium vortex flow, the blades being retained in the "fir-tree" slots by Nimonic locking strips. The independent discs are forged in high temperature stainless ferritic steel and the faces of these discs, together with the blade roots, are cooled by air taken from the compressor outlet and fed down the central shaft. Nimonic 75 is used for the stator blades which are cut from rolled strip section, retained in their austenitic steel shroud segments by welding. The complete turbine stator is composed of 8 independent segments, the ends of which are located on unsplit rings on the turbine central and exhaust housings. Gaps between the segments accommodate the circumferential expansion without any radial distortion, sealing strips being fitted between the segments to prevent gas leakage.

The rotor is mounted on two sleeve type copper-lead lined pressure lubricated bearings, one forward of the compressor and the other at the rear of the turbine assembly. The bearing housing for the latter is air cooled by air taken from the compressor delivery. The end thrust of the rotating assembly is taken on a white metal lined thrust bearing adjacent to the compressor bearing. The rotor speed of 19,250 rpm is reduced to an output shaft speed of either 1200 rpm or 1500 rpm through a three layshaft, double-reduction, single helical gear system. All the main gears are case hardened and Maag ground to close tolerances, and, to ensure equal tooth loading between the three shafts, both the input pinion and the output wheel are located by the gear meshes only, neither having a central bearing. The quill shaft connecting the turbine and the high speed pinion has gear type flexible couplings at each end, and a flexible coupling is also inserted between the output wheel and the gearbox output shaft. All the bearings in the gearbox are steel-backed white-metal lined shells. The auxiliary gear train is driven from the output shaft of the gearbox and provides four separate drive positions for fuel pump, lubricating oil pump, governor and tachometer. The 24 volt dc electric starting motor is also mounted on the gearbox and drives on a gear ring on the output shaft.



Where appropriate, a combined fabricated frame is supplied for the engine and the driven unit. The rectangular portion of the frame under the turbine also serves as a lubricating oil tank and an armored sight glass in the side renders the oil level immediately visible. The gearbox provides one of the bearings for the driven unit and, because of the flexible coupling between the output shaft and the main gears within the gearbox, some small degree of misalignment between the driven unit and the turbine can be tolerated. Where the driven unit is already provided with two bearings, one additional gear type flexible coupling at the driven end caters for all forms of misalignment. In this case, a shorter turbine frame can be used.

Starting is carried out by operation of a single hand wheel, which controls both the fuel supply and sequence of operation of the electrical circuits. The starting power is obtained from 24 volt batteries. Lubricating oil is supplied to the engine from the tank in the turbine frame through an external cooler and filter by a gear type pump mounted on the gearbox. An additional pump is driven from the 24 volt dc auxiliary motor to supply lubricating oil during the start and shut down period. Governing is by means of a fly-weight type hydraulic governor driven from the gearbox and contolling the fuel directly. A manual speed control is positioned on the instrument panel, which in turn is resiliently mounted from the gearbox and carries the engine temperature galvanometer, an electric tachometer, fuel pressure, lubricating oil pressure and temperature gauges, and an auxiliary motor warning light. Automatic devices are fitted to protect the engine against overspeed, loss of lubricating oil pressure and excess engine temperature.

GRAVEL TRUCK FLEET SWITCHES TO DIESEL

WHEN A & B, Inc., a gravel truck fleet operator in West Texas, made the decision to convert their fleet of gravel trucks to diesels, they went all the way. Their initial purchase was 17 Model DC-75T Autocars in one order. Only two trucks of the original fleet were retained. The new fleet, powered with Cummins diesels, went into operation in early April 1957. During May these trucks hauled 1,774,326 ton-miles and used 28,591 gallons of diesel fuel. The Cummins engines powering the trucks produced over 50 per cent more miles per gallon of fuel than the two butane trucks remaining in the fleet. While averaging 4,000 to 7,000 miles each per month, the new fleet has, in the words of A & B, Inc., Secretary-Treasurer Angus A. Voss, "upped our hauling 15%." Truck Foreman Don R. (Tedo) Page adds that "We work ourselves out of a job every once in a while because these Autocars get us caught up in a hurry!"

President of A & B, Inc. is John G. Adams, who has been a principal in the company since it was founded in July of 1953 with two trucks. Within a year, the enterprise expanded to 16 trucks, operating in the Permian Basin area of West Texas. Headquarters are at 1811 West Second, Odessa. After converting to the Cummins-powered Autocars, Adams said, "We feel we have the best equipment on the road today . . . Our records show that we are hauling the same amount of material with our present 19 trucks as we did with 25 trucks before."

The A & B, Inc. fleet currently is leased to Permian Sand and Gravel Company. Deliveries are made to Permian Sand and Gravel Co. customers in a three hundred mile wide area surrounding Odessa. Sand and gravel is trucked from the company's rock pit at Notrees and a sand pit at Grandfalls.

The new seventeen truck fleet was bought from West Texas White Truck Equipment Company, Inc., of Odessa. The Autocar trucks are powered with Cummins model HRFB diesel engines rated 180 hp. The engines are governed at 2,000 rpm. The trucks are equipped with Hobbs Schonrock cable dump trailers with a fifteen yard capacity.

The Notrees pit is always a busy place as the Cummins-powered Autocars move in for loading and out again to make deliveries to customers in the bustling Permian Basin area surrounding Odessa. Note rock crushers of Permian Sand and Gravel Company at far left.

Gravel is loaded into the Hobbs Schonrock cable dump trailer at the Notrees pit of Permian Sand and Gravel Company. Power for the Autocar tractor is a model HRFB Cummins diesel.

President of A & B, Inc., John G. Adams, happily displays his figures, showing improved operations and lower costs since the fleet switched to Cummins diesel engines.

On the job, these trucks leave the rock pit of the Permian Sand and Gravel Company near Notrees to make a customer delivery.

GAS TURBINE PROGRESS

A COMMENTARY BY R. TOM SAWYER

R. Tom Sawyer's well known in the gas turbine field having been the first chairman (1944) (and now treasurer) of the Gas Turbine Power Division of ASME. He spent 7 years with G.E. Transportation Dept., and 26 years with American Locomotive, now Alco Products. At present he is a Consultant, including "Consultant to the Staff" of the Experimental Towing Tank at Stevens Institute of Technology. In addition to being a Fellow Member of ASME and AIEE, he is a member of SAE, ARS, ANS, IME in London, DEUA in London. He is also a member of Franklin Institute and a Professional Engineer. Mr. Sawyer is the author of *The Modern Gas Turbine* and *Gas Turbine Construction*, and co-author of *Applied Atomic Power*.

Gas Turbines for Central Station Applications

THE electrical engineer, and specifically the AIEE, are more and more taking an interest in the gas turbine as a central station unit. At the February (2-7) 1958 General Winter Meeting in New York of the AIEE, Mr. Z. Stanley Stys* presented an excellent paper** on *Large Gas Turbines for Central Station Application*. The following are abstracts from this paper.

The first Brown Boveri central station gas turbine unit placed in service on this continent was at Vermilion, Canada, October 1954. Operating data of this 7000 kw unit is given in Table I. This was the first of a new line of single shaft units. The 25,000 kw units installed at Livorno, Italy in February 1956 were the first of a new line of two shaft gas turbine units, see Fig. 1. These had an efficiency of 24% with no regenerator, however an intercooler is used between compressors and two combustors are used in series, one prior to each turbine to maintain inlet temperature of 1200°F.

Based on the design developed for the above two units in the new line of turbines, orders were placed in 1955 ranging from 6,000 kw to 30,000 kw for 16 units and in 1956 for 17 units plus 12 classified units for the West German Navy (NATO). These units entered many countries including repeat orders in Canada, Italy, Saudi-Arabia, and Venezuela and new turbines installed in other parts of the world including Algeria, Sweden, Israel, Pakistan, Puerto Rico, Austria and Germany. Late in 1955 a 7000 kw unit was placed in service at St. Dizier, France operating with a temperature of 1400°F entering the turbine. Since then 8 more turbines operating at this temperature have been placed in service or on order, all located near Switzerland, as in France and Germany with one in England. Taking all types of Brown Boveri gas turbines built specifically for power generation it is reported that between 1955 and 1957 over 60 units were ordered for a total output of over 1,000,000 kw.

In conclusion Mr. Stys states in his paper: "Based on the results of the operating experience accumulated through the years from 1939, when the first commercial gas turbine was put into operation until now, we can definitely say that the large gas turbine found a place in utilities and can be considered a reliable machine for power generation, either for the base load or for covering peak load. The true comparison of the gas turbine versus the steam turbine can only be made on the plant-to-plant basis. Such factors as smaller area, smaller foundation, lower cubical volume figure of the complete plant can then be evaluated in favor of the gas turbine. As far as the maintenance is concerned, the figures show that it is in the order of about ⅓ that of a standard steam plant. This maintenance cost includes overhauling of the turbine every year, the necessary cleaning, etc. In peaking service especially, the fast start and remote-control possibilities offer special economical consideration."

"The obvious trend in future considerations is to achieve larger and larger units with better efficiency. The largest unit built and operating so far is the Beznau No. 2 unit with an output of 27,000 kw. The world's largest power plant is in Livorno, Italy, where two 25,000 kw gas turbines produce 50,000 kw. The next step will be Edmonton, Canada, which will have a capacity of 60,000 kw in two 30,000 kw units. Finally, Vancouver, British Columbia, when built, is going to be the world's next largest gas turbine power plant probably for a long time as it will have four 30,000 kw gas turbines, with a total capability of 120,000 kw. There is enough accumulated experience to build units larger than 30,000 kw. A 50,000 kw unit can be readily built having the same space as a 30,000 kw or 20,000 kw unit. It is ultimately possible even to build a 100,000 kw unit which will have approximately the same space and which would work on the principle of a combined steam and gas turbine cycle where the steam is generated at the super-critical conditions. An efficiency of over 45% of such cycle seems to be feasible. Although to-day gas turbines have found a place or permanent existence in different branches of industry, with these large sizes, the utilities will be the most obvious place for their application."

For a specific comparison to show the progress made by Brown Boveri again look at Fig. 1 which shows the floor layout of the 25,000 kw Livorno

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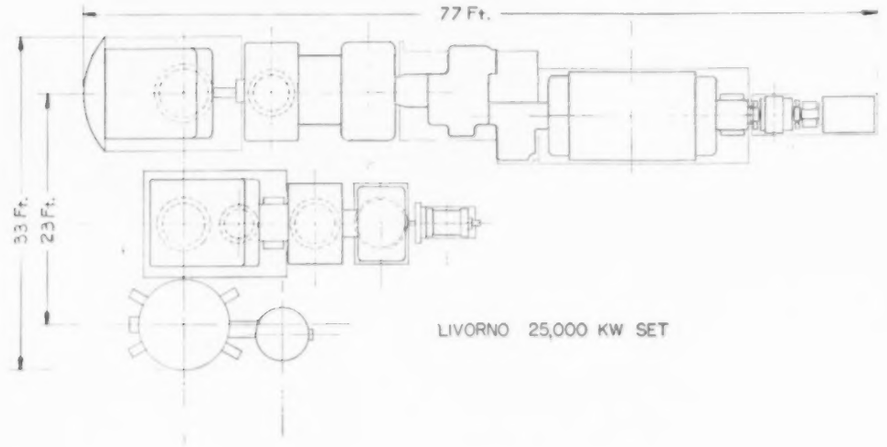
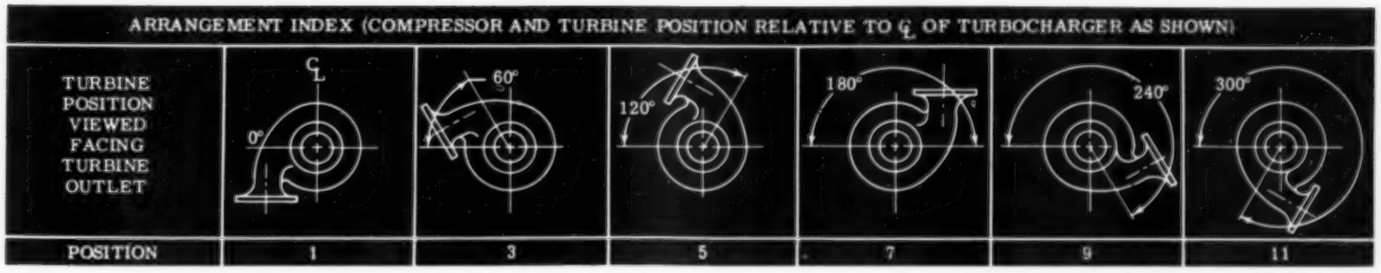
*Vice President, Brown Boveri Corporation, 19 Rector Street, New York 6, N. Y.

**No. 58-164, American Institute of Electrical Engineers, 33 West 39th Street, N. Y. 18, N. Y.

Fig. 1.—The Canadian Edmonton Plant of 30,000 kw has this same floor plan. A 50,000 kw unit can be placed in this area.





TURBOCHARGER FOR SMALL DIESELS

By DOUGLAS SHEARING

DIESEL engines in the 80-130 horsepower class, naturally aspirated, can now be economically boosted into the power range of engines twice their own weight with the aid of the latest model AiResearch turbocharger. The T-7 turbocharging unit, whose development has been announced by The Garrett Corporation's AiResearch Industrial Division, Los Angeles, was designed specifically for small diesel engines. This newest member of the AiResearch turbocharger family weighs but 24 lbs, measures 8½ in. in length and diameter. It is capable of feeding 15 to 30 lbs of air per minute into diesel engine cylinders under normal conditions. Since AiResearch turbochargers are air cooled, no complicated plumbing is necessary for installation. In addition to increased horsepower ratings at sea level and high altitudes, other benefits effected are lower specific fuel consumption, cooler operating and cleaner burning engine, less noise and almost complete elimination of exhaust smoke.

The unit has successfully passed endurance tests by various engine manufacturers. Because of its small size, the T-7 will prove useful and economical for multiple unit installations where single units of larger turbochargers would not be feasible. Small size and weight and economical cost of this unit has attracted the interest of even aircraft and automobile manufacturers.

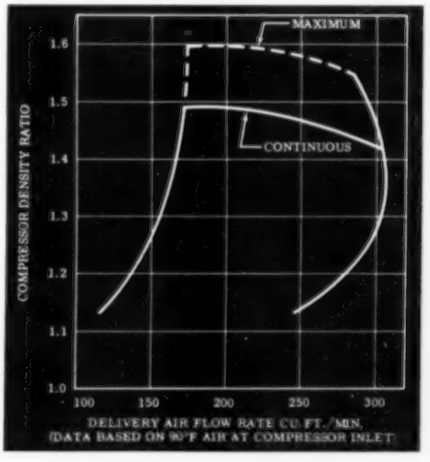
Through the flexibility and simplicity of its basic design, the normal range of the T-7 can be greatly extended with minor modification of the aero-dynamic components.

The turbine wheel is a single-piece investment casting of a radial 90 degree type. The material composing the turbine wheel is one of the new alloys developed for jet engines, and therefore has high heat resistance properties. The rotating group is mounted on two journal bearings, lubricated by filtered engine oil. Normal operating speed is in the 70,000 to 85,000 rpm range. Exceptional efficiency of this turbocharger for a unit of its size enables it to reach the cross-over point, proven in actual engine tests, at engine exhaust temperatures of 850 degrees. The cross-over point is that operating condition at which compressor out pressure exceeds turbine inlet pressure. For higher engine loads a pressure differential exists which promotes good scavenging, lower exhaust temperatures, and better over-all engine acceleration with less smoke.

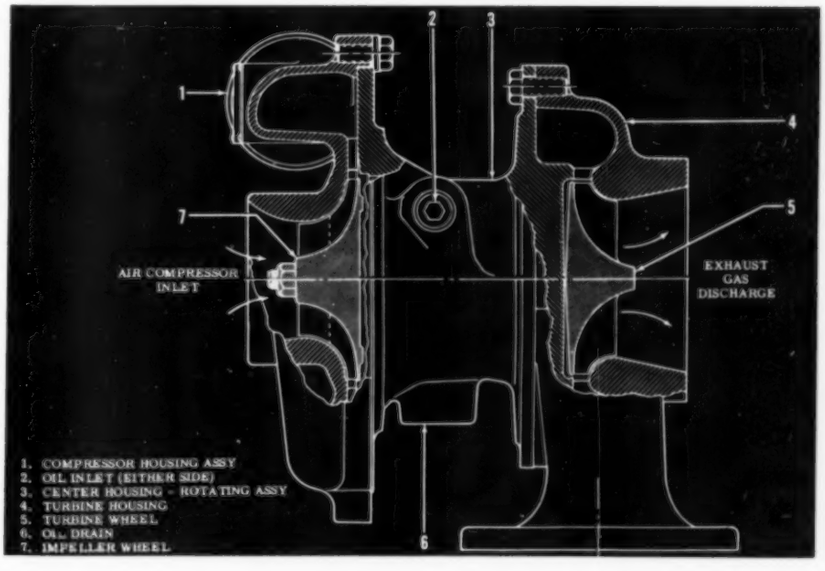
Good component efficiencies coupled with properly matched components will create this desirable condition. Until this condition is reached, maximum engine acceleration cannot be attained without excessive smoke regardless of turbocharger acceleration characteristics.

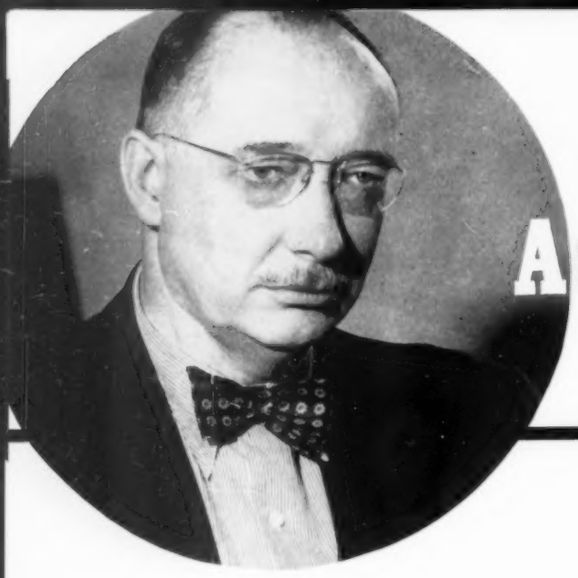
It is claimed its simplified design incorporates fewer parts than any other production turbocharger, and these parts are designed for high quantity fabrication.

Besides the basic T-7 turbocharger, two variants are available, designated the T-6 and T-9. The T-6 has 25% less through-flow than the T-7; the T-9 has 25% greater through-flow. Both machines have the same external configuration as the T-7.



Turbocharger Model T-702





AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY MERRILL C. HORINE

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

Diesels Need Not Smoke

SMOKE of any kind is the result of incomplete combustion, which, in a diesel engine may be caused by a number of things. Some fuels are more prone to burn with more smoke than others in the same engines. Some engines, likewise, produce more smoke than others with the same fuel. With everything else favorable to clean combustion, smoke can be caused by a defective spray pattern from the injection nozzles, by dribbling nozzles, late injection timing or other minor derangements. Obviously, the elimination of these causes lies with the design of the engine, the quality of the fuel and the maintenance of the engine. When the proper fuel is used in a well-constructed engine, properly adjusted and maintained, smoke should be at a minimum. Almost any diesel will emit a puff or two of smoke when started up and when suddenly accelerated, particularly if it is turbocharged, but such smoking is normally of only a few seconds duration. When operating at any load or speed within its normal range, smoke density should be scarcely perceptible.

Air-fuel Ratio

For clean combustion, the air-fuel ratio should never be less than 16 to 1, that is, 16 pounds of air to 1 pound of fuel at atmospheric pressure. Lower ratios than this can be produced in several ways: Restricted air intake, such as caused by a dirty air cleaner, one that has become iced up, or by faulty intake valve operation can reduce the volume of air taken in, so that insufficient air for the quantity of fuel injected results. Over-injection of fuel is the commoner cause. This may result from mal-functioning of the injection system or governor, by improper adjustment or tampering with the metering element in the injection system. Many diesel drivers still labor under the wholly false impression that unless there is smoke in the exhaust, the engine is not producing its full power. All of these effects can be eradicated by proper maintenance of the engine and by proper discipline of drivers, effective sealing of all adjustments and regular inspection of the seals.

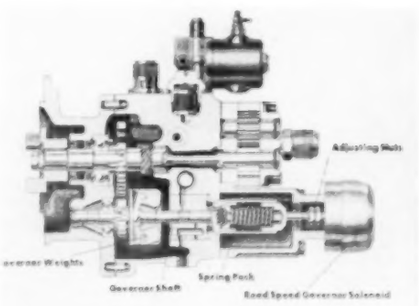
Inherent Causes

But there are other causes of over-injection which are more or less inherent in the operation of a diesel, particularly an automotive diesel with its frequent and radical changes of load and speed. Where the metering control is directly connected with the accelerator, the impatient and heavy-footed driver may suddenly dump the maximum quantity of fuel through the nozzles, while the engine is turning at relatively slow speed. As it takes a measurable time for the engine to gain sufficient speed to deliver the increased volume of air required, the result will be momentary smoking. The result is intensified where a turbocharger is used, since it takes from 4 to 5 seconds for the turbocharger to speed up sufficiently to deliver the requisite quantity of air. Systems in which the accelerator, instead of being connected directly with the metering control, acts through the governor, provide enough momentary lag to mitigate this effect to some extent; but not entirely. In either case, if the load on the engine is great enough to prevent the engine gaining speed, then the engine will labor and smoking will be continuous, or at least prolonged.

Alleviation of this condition in engines which are sensitive to such over-injection has been largely effected through the use of a corrective device, responsive to intake manifold pressure, acting on the metering control. When a sudden call for greatly increased fuel delivery occurs at low manifold pressure, this device, comprising a spring-opposed diaphragm connected with the intake manifold and acting upon the metering linkage, reduces maximum fuel delivery until the manifold pressure rises. This device is not usually required on naturally-asperated engines; but when turbochargers which are fairly slow in response are used, it has proven beneficial.

Road-speed Governors

Traditionally, engine governors are for the purpose of limiting the maximum rotative speed of the engine itself, since overspeed is highly destructive. Their effect upon maximum road speed depends upon the total gear reduction between the engine and the driving wheels and the rolling radius of the driving tires. In a diesel engine, the governor controls speed by limiting the volume of fuel injected. Long recognized is the fact that low numerical (fast) ratios are favorable to fuel economy, since, under favorable conditions they permit the desired road speed at an engine speed below the maximum, and at which the engine is most economical. However, such ratios do sometimes permit maximum road speeds faster than legal or prudent. Reducing maximum engine speed to limit road speed is emphatically not the answer, for such governing would be effective in all transmission speeds, thus restricting the power available for acceleration and for grades. For this



Section of Cummins governors showing solenoid for road-speed control.

reason, through the years, various types of road-speed governors have been developed and have had limited use. Such governors restrict fuel delivery in accordance with vehicle miles per hour, irrespective of engine revolutions per minute. Such governors, however, cannot replace the engine-speed governor, for engine manufacturers properly insist upon protection of the engine itself against overspeed. The road-speed governor alone would not prevent such engine overspeed in the slower gears. For this reason the most promising road-speed governors are made auxiliary to the engine governor. Thus, in top speed the road-speed governor element takes over the control of the engine speed and in the slower gears, the engine-speed element.

A recent development along this line by Cummins Engine Company comprises a speed-sensitive switch, consisting of a small centrifugal element

actuating a pair of electrical contacts and a solenoid attached to the engine governor. The speed sensitive switch is driven by a flexible shaft from a two-way speedometer drive adaptor on the transmission tailshaft. It is adjusted to the maximum road speed desired. At all speeds below this maximum, the contacts are closed and the circuit is established through the solenoid which pushes against the governor spring pack, producing the normal resistance to the governor fly-weights for engine-speed control. When maximum road speed is attained, the speed-sensitive switch contacts are opened, thus de-energizing the solenoid so that it retracts and weakens the governor spring, so that the governor reduces the fuel delivery to restrict the engine speed. An over-run of from 4 to 8 per cent is permitted between full load and light load conditions to prevent cycling or hunting. A variation of this governor operates from the Tachograph when such is installed on the vehicle, eliminating the speed-sensitive switch.

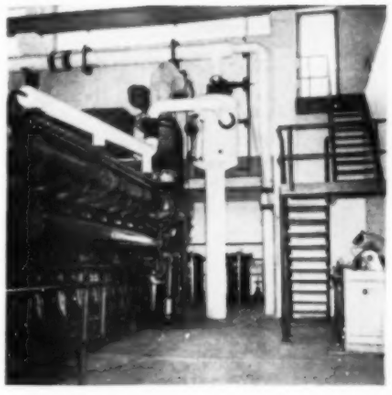
There is still room for additional development in diesel governors for automotive application. No practicable governor so far developed provides any appreciable restraint on maximum speed when descending grades, or on engine speed when the driver resorts to the slower gears to utilize engine retardation in addition to the brakes. We may confidently expect other developments along the line of road-speed governors, both in the interests of economy obtainable with faster top ratios and of safety.

Manager Of New York Office

H. W. Dow, Jr.

Appointment of H. W. "Herb" Dow, Jr. as Manager, New York District Office, Engine Division, is announced by Robert E. Friend, President, Nordberg Manufacturing Company, Milwaukee, Wisconsin. Mr. Dow succeeds A. R. McMullin, who elected to retire December 31, 1957 after serving as Manager in New York since March 1, 1936. The engineering industry has recognized "Mac" McMullin for his 21 years of outstanding service in charge of the eastern district for Nordberg and prior to that, 13 years as Sales Manager for the Busch-Sulzer Bros. Diesel Engine Company. Mr. Dow was born in Rockford, Illinois and following his early education in Memphis and Milwaukee, he enrolled in the University of Wisconsin's School of Engineering. After graduating in 1936 as a Mechanical Engineer, Dow rounded out his engineering training spending six years with a prominent electrical engineering firm on general, test and sales engineering for industrial and central station electrical equipment. Dow joined Nordberg as a production engineer in 1943 and entered sales engineering in 1945. He advanced to District Manager for Nordberg's Mideastern Territory and served for two years as Staff Assistant to R. W. Bayerlein, Vice President in charge of the Engine Division at Milwaukee. Since January, 1955, Dow has been a Special Representative of the Engine Division in the New York Office.

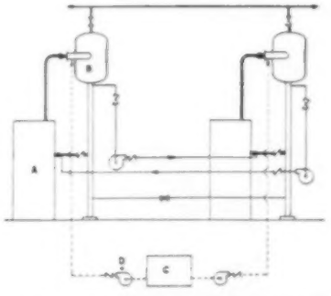
VAPOR PHASE® CONTRIBUTES TO SUCCESSFUL USE OF HEAVY FUEL AT FLORIDA KEYS ELEC. COOP.



FULL YEAR'S OPERATION ON No. 6 FUEL SHOWS SAVINGS OF $25,518.09

The installation uses two Superior 8-Cylinder, 1,422 H.P. Diesels, direct-connected to 1000 kw. Ideal Generators. The compactness of the Vapor Phase cooling system is clearly shown.

THE successful conversion to a heavy fuel system at Plant No. 2 of the Florida Keys Electric Coop., at Marathon, Fla., has been greatly aided by the complete Vapor Phase cooling system supplied by Engineering Controls. Outlet jacket water temperature is maintained at the 220-230° level, and engine operation on No. 6 fuel is simplified by a cooling system which keeps the top of each engine hot at all times, and insures a free flow of heavy fuel. The 12-month fuel-cost savings is enough to tell the story of successful operation. The Coop. has purchased a 3,000 kw. unit with Vapor Phase cooling for immediate installation.



Saturated steam and water pass from engine (a) into Vapor Phase Separator (b). Water circulates by convection back down standpipe into engine inlet and absorbs rejected heat. The steam is used for heating fuel oil. Condensate is returned to collector (c), then returned to system by pumps (d).

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SS — for engine-driven generator sets with out-board bearings

DOUBLE FLEXING
AMR — for engine and medium speed drives

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
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4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

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WARREN, PENNSYLVANIA, U. S. A.

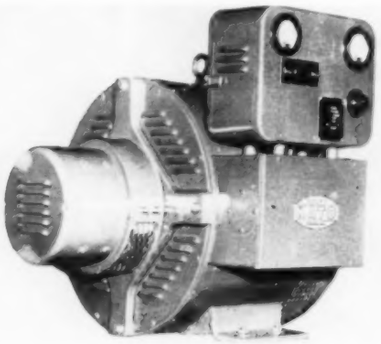
Consulting Engineer Establishes Office

Ralph Miller

Ralph Miller has established an office at 1943 N. Summit Ave., Milwaukee 2, Wisconsin to provide design and consulting service for licensees under his patents covering the Miller system for internal combustion engines. Specializing in high output supercharging of two and four cycle diesel, dual fuel and spark ignition engines, he offers consulting service to both users and builders of engines utilizing his system. Mr. Miller travels frequently to Europe, where licensing under the Miller patents is being directed by a consulting engineer with office in Paris.

Improved 60 Cycle Generators

Recent improved design features of the single bearing and two bearing close-coupled 60 cycle Kato generator line for adaptation to commercial diesel engines have been announced. Three principle design features are involved. The exciter endbell bearing has been completely eliminated with the exciter armature being supported by the main alternator bearing. Only one heavy duty ball bearing, grease sealed for life, is used as the drive end of the generator and it is supported by the engine. If specified, two bearing close-coupled machines can be supplied throughout the line. A sleeve in the armature fits over an extension of the main rotor shaft. This feature reduces weight, contributes to ease in assembly and disassembly and contributes to the overall compactness of the alternator. The length of the mounting feet has been reduced and the use of four mounting feet eliminated in most cases. This permits accuracy and ease of alignment of the generator to the engine.



If shimming is necessary, it very often can be accomplished at only one point. Coupling and adapter lineup is simplified and the possibility of distorting the generator frame by forcing it down at several points is eliminated. The design and placement of outlet box and control panel has been improved. In many cases, the lamination diameter has been increased and the core length decreased. Cooling fan and shaft design has been improved. All of these factors, together with reduced weight and length due to sleeve-type exciter, contribute to the overall compactness of the alternators. A typical model is illustrated. The 60 cycle, 3 phase line extends from 400 watts to 5000 watts in revolving armature type and up to 400 kw in revolving field type. Single phase, 60 cycle alternators are available as large as 100 kw. All of these generators can be supplied by Kato Engineering Company of Mankato, Minnesota, in standard two-bearing design as used with belted drive arrangement.

ITS NEW

Diesel Fumes Can Now Be Eliminated

Philadelphia Transportation Company has found a truly practical and economical way to combat the bus exhaust fumes problem. Much of the credit for this new development goes to Frederick C. Binter, a Philadelphia research chemist and president of Independence Chemical Company. He has developed a successful exhaust-purifying device called "Nodorizer," and a complex chemical compound, "Dieseleen," which neutralizes the unburned hydrocarbons and re-odorizes diesel exhaust fumes with a clean fresh-air scent.

At the garage, PTC officials found that Binter had not just solved the problem of perfuming the exhaust, but had actually found a way to neutralize it completely. On the technical side, Binter explained that the "Nodorizer" unit takes the pressurized air from the engine "wind box," forces it through a chemical compound, and then the force of this air stream injects the chemical into the exhaust pipes, resulting in the "new smell" in diesel exhaust fumes. In effect, Frederick Binter has presented the Philadelphia Transportation Company, and all diesel truck and bus operators, with an entire system of exhaust treatment that is easily installed, cartridge-recharged, economical and efficient to operate. As proof of its economy, the units have been successfully working on 125 PTC buses without lapse for 3 months. This trial run indicates an expense of six-tenths of a cent per unit per operating day!

ITS NEW

Gas Turbine Progress

(Continued from page 56)

plant. The area of 77 ft x 33 ft is about 2500 sq ft or 10 kw per sq ft. The 13,000 kw Beznau plant has an area of 62 ft x 45 ft, which is about 2800 sq ft or approximately 5 kw per sq ft. The Edmonton, Canada 30,000 kw unit has the same floor plan as Fig. 1 or approximately 12 kw per sq ft. As stated above a 50,000 kw plant can be placed in this area amounting to about 20 kw per sq ft or 4 times better than the Beznau unit. This shows real progress is being made in the use of large gas turbines for central station power plants.

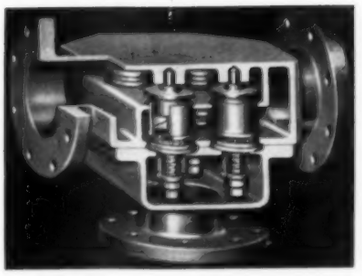
TABLE 1—Data of Single Shaft Unit.

Time Interval	November 1954—November 1956
Cost of parts exchanged	$310.50
Type of service	Peaking load
Average starts * per day	2
Total number of starts	747
Total operating hours	10,990.5
Total generated output	59,081,400 kwh
Average load	5375 kw
Daily peak: Winter	7,000—8,200 kw
Summer	5,400—7,000 kw
Duration peak	35 minutes
Rated load	6,200 kw
Fuel	Natural gas
Efficiency at 6,000 kw, 72°F	21.2% resulting in gas consumption of 18.34 cu ft/kwh
Inlet Temperature to turbine	1,200°F

*Approximate starting time up to full load, 6 minutes.

Builds Kansas City Plant

Metal Finishers, Inc., Cleveland, Ohio, announces the construction of a new plant at 3125 Brinkerhoff Road in the Fairfax Industrial District, Kansas City, Kansas. The new facilities will chromium plate by the exclusive Mecrome Process new and used cylinder liners for the railroad, pipeline, refinery and river boat industry. The building will be a one story masonry structure of 25,000 sq ft situated on approximately 2½ acres of land and will include railroad siding facilities. It will be in operation in early 1958. The plant will have a capacity of 60,000 amperes of plating current and will utilize the latest Germanium saturable reactor core rectifiers with magnetic amplifiers. This new development in rectifiers stabilizes the current to each liner regardless of input variations and enables chromium plating to be applied to a precise thickness. Honing equipment will incorporate the latest type hydro-mechanical controls and will be capable of handling a wide variety of liner types and sizes. Metal Finishers, Inc. main office and factory are at 1725 East 27th St., Cleveland 14, Ohio.



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SAFETY Provided for by multiple independent elements as shown above.

√ Provided for by rugged AMOT element construction. No AMOT element has ever stuck closed since its introduction 6 years ago. Many years of "know how" are built into every AMOT element.

√ Omission of all hand operators means engine temperature is safe from tampering by engine attendants. AMOT is the only engine thermostat that can be considered safe without a hand operator.

√ Lack of capillary tubes, bulbs, and packing glands means no failures from kinks or leaks.

SERVICE There is only one replacement part—the element. Renewal of element renews all working parts. Element replacement, if ever required, is several times faster than on any competitive make. Original accuracy of temperature setting is always provided in element replacement.

√ AMOT engineers are available in most major cities to help on application and other problems.

√ Most models are available from stock for rush orders.

MODELS ½" to 6" pipe sizes. Larger sizes in iron, bronze or ductile iron.

AMOT CONTROLS CORPORATION • FIRST ST. & NEVIN AVE. RICHMOND, CALIFORNIA

MANUFACTURERS OF QUALITY ENGINE THERMOSTATS & SAFETY CONTROLS

MARK EASTIN

HAS TWO BRIGGS CD LUBE OIL CLARIFIERS FOR ITS 2-2800 BHP 16 CYLINDER DIESELS.

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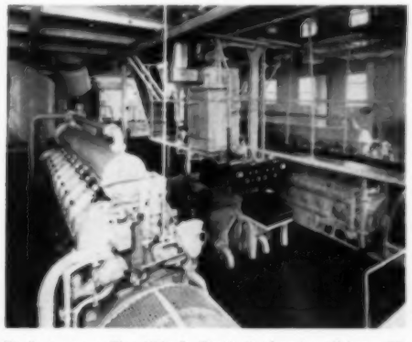

Engine room, The "Mark Eastin," showing Briggs CD units installed.

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Gulf Coast Diesel Notes

By **Michael T. Pate**

TELLEPSEN Construction Company, Houston, Texas, has purchased from Stewart & Stevenson Services, Inc., Houston, two General Motors marine diesels, series 71, models 6071-A and 6072-A, each of which will drive a hydraulic pump. The Company also took delivery of a General Motors 6-cylinder marine diesel, series 110, which has been unitized with a pump.

THE Western Company, Odessa, Texas, has bought from Cummins Sales & Service, Inc., Fort Worth, Texas, two model VT-12-BI Cummins diesels, rated at 600 hp, each of which will be used to drive one of the company's Frac-Masters.

OILWELL Supply Company, Houston, has taken delivery from Stewart & Stevenson Services, Inc., of Houston, of two model 3GD-53 50 kw ac generator sets, each powered by a General Motors series 71, 3-cylinder model 3030-C diesel. The order also included two Stewart & Stevenson model 2GD-23 20 kw ac generator sets, each driven by a General Motors diesel, series 71, model 2030-C, 2-cylinder. In addition, delivery was taken on two Stewart & Stevenson model 6GD-108 ac generator sets, rated 100 kw, and driven by General Motors diesels, 6-cylinder, model 6030-C, series 71. One model 20 DA oilfield utility unit, powered with a series 71, 2-cylinder, model 2030-C General Motors diesel completed the order.

GULF Oil Company, Houston, has taken delivery on a model 6LRDBSU Waukesha diesel powered 300 kw ac generator set for use on a drilling barge. The unit was furnished by Waukesha Sales & Service, Inc., of Houston.

LANGLEY Grain & Feed Company, Tucumcari, New Mexico, has repowered an I-H truck with a model JT-6-B Cummins diesel, rated at 175 hp. The engine was furnished by Cummins Sales & Service, Inc., Fort Worth, Texas.

DEL MASTRO Associates, Allwood, New Jersey, has purchased from Stewart & Stevenson Services, Inc., of Houston, four Stewart & Stevenson model RD-20 20 kw ac rig lighting plants, each powered by a series 71, 2-cylinder model 2030-C General Motors diesel.

DUVALL Sulphur & Potash Company, Hobbs, New Mexico, has repowered another of its underground working Jeeps with a model 185DLC Waukesha diesel. The engine is rated 55 hp at 2000 rpm. Delivery was made by Waukesha Sales & Service, Inc., of Houston.

MIZELL Construction & Truck Line, Inc., Liberty, Texas, has bought from Cummins Sales & Service, Inc., Fort Worth, Texas., two model JT-6-B Cummins diesels, rated at 175 hp, which will be used to repower Mack B-60 trucks.

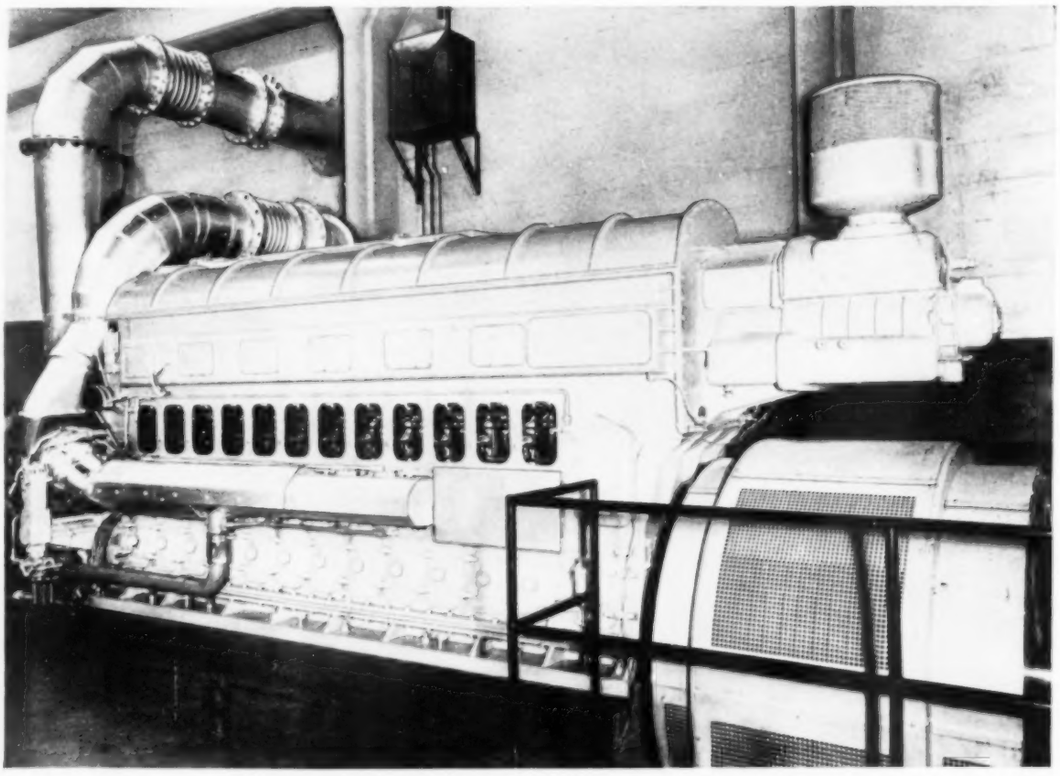
GARDNER-Denver Company, Dallas, Texas, has bought from Waukesha Sales & Service, Inc., Houston, two model 135-DKU Waukesha diesels, rated 106 hp at 1800 rpm.

J. E. HARVILLE, Corsicana, Texas, is repowering an Autocar DC75T with a 190 hp model HRFB Cummins diesel, which he purchased through Cummins Sales & Service, Inc., Fort Worth, Texas.

SAN JACINTO Venezolano, S.A., Houston, Texas, will drive a De Laval pump with a 200 hp series 100, 6-cylinder, model 62406 General Motors Diesel which was sold and unitized by Stewart & Stevenson Services, Inc., Houston.

S. A. BOURG & Sons, Lockport, Louisiana, has purchased five model HFRB Cummins diesels, each rated 190 hp, which will be used to repower IHC mod-

NOW Fairbanks-Morse TURBOCHARGED



Now from Fairbanks-Morse comes the year's most significant power news: the Opposed-Piston diesel is turbo-supercharged!

Backed by 20,000 hours of actual operation and research, this new, yet proved, design increases O-P horsepower by 50%. At 900 rpm., for example, the turbocharged O-P is conservatively rated at 300 hp. per cylinder. Combining simple, two-cycle Opposed-Piston design of engine with new Fairbanks-Morse-designed system of turbocharging produces compact, reliable power with low operating and maintenance costs. None of the basic O-P advantages have been eliminated. In fact, many parts are interchangeable between turbocharged and non-turbocharged Opposed-Piston engine models.

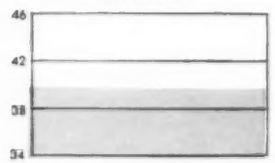
More Power

The un-turbocharged O-P is the industry's leader in compact power . . . now 50% more power can be placed in the same installation with the same size turbocharged O-P.

Lower Weight

—per horsepower. Increased O-P power is more widely applicable where weight and foundation costs are restrictive. Weight per horsepower has been reduced by 27%.

Increased Thermal Efficiency



The new, performance-proved thermal efficiency of the turbocharged Fairbanks-Morse Model 38TD-8⅛ O-P diesel is knocking on the door of a new high of 40% efficiency.

el 2124's. The diesels were furnished by Cummins Sales & Service, Inc., Fort Worth, Texas.

E. L. LESTER Company, Houston, Texas, has had Stewart & Stevenson Services, Inc., Houston, install a series 71, 2-cylinder model 2031-C General Motors diesel in one of their hoists. This unit utilized a Cotta transmission. The diesel is rated at 40 hp. The Company also equipped another hoist with a series 71, 3-cylinder, model 3082, torque-converter equipped General Motors diesel.

THE CHICAGO Procurement Office, Corps of Engineers, U.S.A., has taken delivery of an additional 60 Stewart & Stevenson 45 kw 400 cycle ac generator units, each powered by a General Motors series 71, 4-cylinder model 4055-C diesel.

GLASER Construction Company, LaFayette, Louisiana, has bought for tugboat power ten model NRTO-6-M Cummins diesels, rated at 335 hp each. The engines were delivered by Cummins Sales & Service, Inc., Fort Worth, Texas.

SPERRY Gyroscope Company, Great Neck, New York, has bought from Stewart & Stevenson Services, Inc., Houston, four Stewart & Stevenson 75 kva 400 cycle ac generators, each driven by a series 71, model 4071-T turbocharged General Motors diesel.

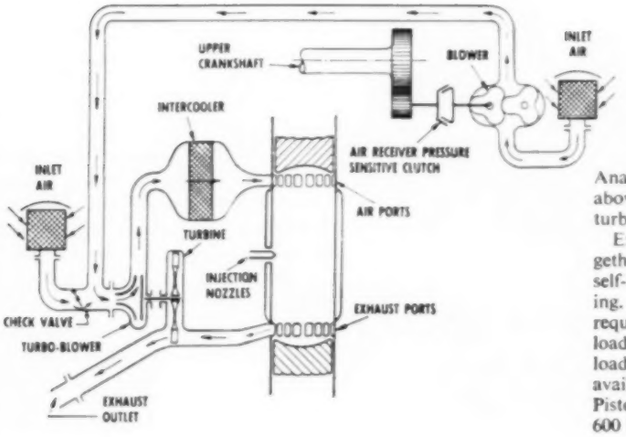
HERRIN Transportation Company, Inc., Houston, Texas, has bought five model JT-6-B Cummins diesels from Cummins Sales & Service, Inc., Fort Worth, Texas. The diesels will be used to repower Diamond T model 725C trucks. The diesels are rated 175 hp.

PURE Oil Company, Chicago, Illinois, has purchased from Stewart & Stevenson Services, Inc., Houston, a series 71, 2-cylinder, model 2030-C General Motors diesel, which it has had unitized with a hydraulic pump on a housed skid base.

INTERNATIONAL Minerals Corporation, Hobbs, New Mexico, is repowering a Dodge Power Wagon with a model 190DLC Waukesha diesel rated at 72 hp at 2030 rpm. The diesel was sold by Waukesha Sales & Service, Inc., of Houston.

PURE OIL Company, for service in Paraguay, has purchased through Oilwell Supply Company, Houston, a model 190DLCU Waukesha diesel unitized to a generator. The unit was sold by Waukesha Sales & Service, Inc., of Houston.

OPPOSED-PISTON DIESEL
50% MORE POWER
for Marine and Stationary Applications



Matched Engine and Turbocharging

Analysis of many turbocharging options established the above arrangement for optimum performance of the turbocharged Opposed-Piston diesel.

Exact matching of O-P engine and this system, together with manifold design, results in an engine that is self-sustaining over the entire load range, including starting. The small engine-driven auxiliary blower meets the requirements of sudden, large load changes at fractional loads only—and is automatically declutched above ⅓ load. Power formerly used for blower drive is therefore available at the flywheel of the turbocharged Opposed-Piston Diesel. Fairbanks, Morse & Co., Dept. DP-3, 600 S. Michigan Ave., Chicago 5, Ill.

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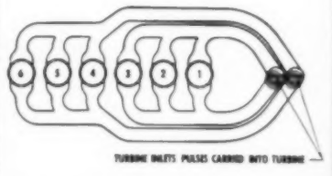
a name worth remembering when you want the BEST

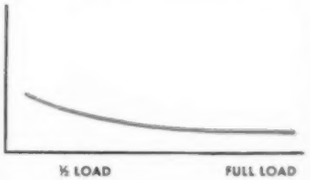
DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • MAGNETOS

Pulse System



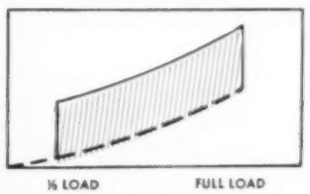
F-M exhaust manifolding carries peak pulse energy directly to the turbine drive, thus taking full advantage of additional driving force available in these exhaust pulses.

Lower Fuel Consumption



For full-load operations, specific fuel consumption of the turbocharged O-P is 5% to 10% lower than un-turbocharged O-P—and very much lower for part loads.

Bonus Power



At loads above approximately ⅓ rating, the auxiliary blower is automatically declutched, thus making additional, usable power available at the flywheel.

REA Meeting Nears

Don't forget the 9th Annual REA Electric Generating Plant Operation and Maintenance Conference, which will be held at the Phoenix Hotel, Lexington, Kentucky, from April 7 through April 10, 1958. There will be many interesting and informative sessions on diesel operation and maintenance, and a cordial invitation is extended to any municipality or utility that desires to send a delegate. Don't miss this important conference.

Piston Ring Replacement Brochure

An eight page brochure designed to help engineers obtain maximum engine performance by careful attention to replacement of piston rings, has been published by the Piston Ring and Seal Department of Koppers Company, Inc. Procedures for checking pistons and cylinders are included in the brochure as well as helpful suggestions on the installation of new rings. Clearance tables for compressors and engines are also given. Copies of the brochure, entitled *Recommendations for Piston Ring Installation*, can be obtained free by writing to Piston Ring & Seal Dept., Metal Products Division, Koppers Company, Inc., Baltimore 3, Maryland.

Florida Diesel News

By Ed Dennis

REPOWERING with a model 40-M5X-8 Superior diesel added new power and life to the Holland built *MV Kirknel*. The 8 cyl turbocharged diesel delivers 600 hp at 900 rpm. The engine was installed by Hendry Corp., Tampa; home port is Kingston, Jamaica and it is used in the West Indies and Central American lumber trade.

THAT new American MARC outboard diesel engine on exhibit at the Miami International Boat Show was a 7.5 hp two cycle opposed piston diesel and probably the first ever exhibited to the Florida boating clan.

CUMMINS Diesel Engine Sales, at Birmingham, Ala., reports a model NH-6B 210 hp at 2100 rpm, in a White 9000 TD hi-way tractor for Frank Middleton and an NH6BI, similar rating, in a Mack LJTID for the Eagle Motor Lines.

A 1500 WATT Petter diesel generating auxiliary was furnished by Brush Aboe for the newly launched trawler *South Seas* owned by Sahlman Seafoods of Tampa and Fernandina Beach. The main engine is a D342 Cat with Snow-Nabstedt 3:1 r&r gears and Twin Disc power take-off; the vessel was constructed by Diesel Engine Sales.

TWO 3-71 General Motors diesel generating units with 30 kw Century generators and Harrison radiators for the *MV Southern Venturer*. It runs supplies for the guided missile bases in the Bahama Islands.

A MODEL D397, series D, Caterpillar diesel generating unit with the new 350 kw SRCV Caterpillar generator for Mercy Hospital. It will take care of all its electrical needs, including the elevators; engineered by Shelley Tractor & Equipment Company.

GENERAL Motors diesel engines on sewer projects for the Pecon Corp., engineering contractors of Dade County, include a 4-71 with a model TCDA 535 Allison torque converter in a ¼ yd Lima back hoe and a 3-71 with a Twin Disc clutch in a Bucyrus Erie 22B ½ yd crane.

THE *Tommy T* is the fourth Hatteras type trawler for J. T. Thompson of Key West. The D342 Caterpillar 150 hp diesel engine turns a 48 x 36 4 blade Federal propeller through 3:1 Snow-Nabstedt r&r gears. The auxiliary is a 2 kw Lister diesel generating set.

THE HOBE Sound Water Company, in Martin County, received a model 3031-C General Motors dieselized pumping unit with an Allis Chalmers centrifugal pump for the town's water system. Included was a Rockford power-take-off and a 12 volt Delco Remy starter and generator.

HOUGH Payloader tractor-shovels with Cummins JN6BI diesel engines each rated 122 hp at 2200 rpm and Allison torque converters were delivered to Carter Landscape Co. of Hollywood and Richardson & Richardson of South Miami.

TWO 14 cu yd International Payscrapers, combining a 2T55 tractor and a 2S55 scraper and powered by a 175 hp Cummins HRB600 with a speed up to 24 mph, for F. A. Chastain, construction contractors of North Miami Beach. They also received a HV Payloader tractor shovel powered with a Cummins diesel rated 122 hp at 2200 rpm with Allison torque converter.

THE 140 x 34 foot *Inagua Arrow* is the latest addition to the West India Shipping Company fleet. Powered with two D375 Caterpillar diesel engines each rated 300 hp at 1000 rpm through 3:1 Snow Nabstedt r&r gears, also included

RESOLUTE (WAKD Series) 1197 cu. in. Normal or Turbocharged DIESEL

WAUKESHA Diesels up to 990 hp for 24-hour duty

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in the engine room are two 19 kva Caterpillar diesel generating sets and Ross heat exchangers on the main engines. It was built by Dade Drydock Company of Miami.

POWERED by a Waukesha, model 195 DLC, six cylinder diesel engine, which developes 76 hp, the Electric Machinery generator delivers 43 kva at 1800 rpm, 60 cycle, 208/416 volt three phase. This Kohler plant also included Korfund vibration isolators and Fram fuel oil filters; engineered by the J. Frank Knorr Inc. for the yacht *Alisa V*.

TWO 65 ton General Electric locomotives, each powered by two model H600 Cummins diesels, which are rated 150 hp at 1800 rpm, will be used in the new Lehigh Portland cement plant west of Miami on the edge of the Everglades.

A PAIR of 500 kw Superior generator sets have been shipped to Havana, Cuba for use in the power plant at the new Habana Hilton Hotel. These are the Superior model 40-S-X-8 diesel engines. Evaporative cooling will be used. Although the engines are standby units, they can carry the regular load if and when needed.

IN THE construction field, Shelley Tractor & Equipment Company delivered to Broward County two D6 tractors and a #12 road grader and Broward Engineering Co. received another D6 dozer, for a total of five. All are powered by Caterpillar diesels.

THE 4 wheel portable pumping unit that Ebsary Foundation Company received, had a 6 inch model FIS Marlow water pump which is powered by a JN6IP Cummins diesel engine. This 6 cylinder engine, with a bore and stroke of 4⅛ x 5 in., has a max hp of 125 at 2500 rpm.

RECENTLY launched at Fernandina Beach by Tiliakos Boat Company, the 62x18 ft trawler *Dixie Isle*, powered with a General Motors 6-110 diesel with 220 cont hp at 1800 rpm and turns a 50x44 five blade propeller.

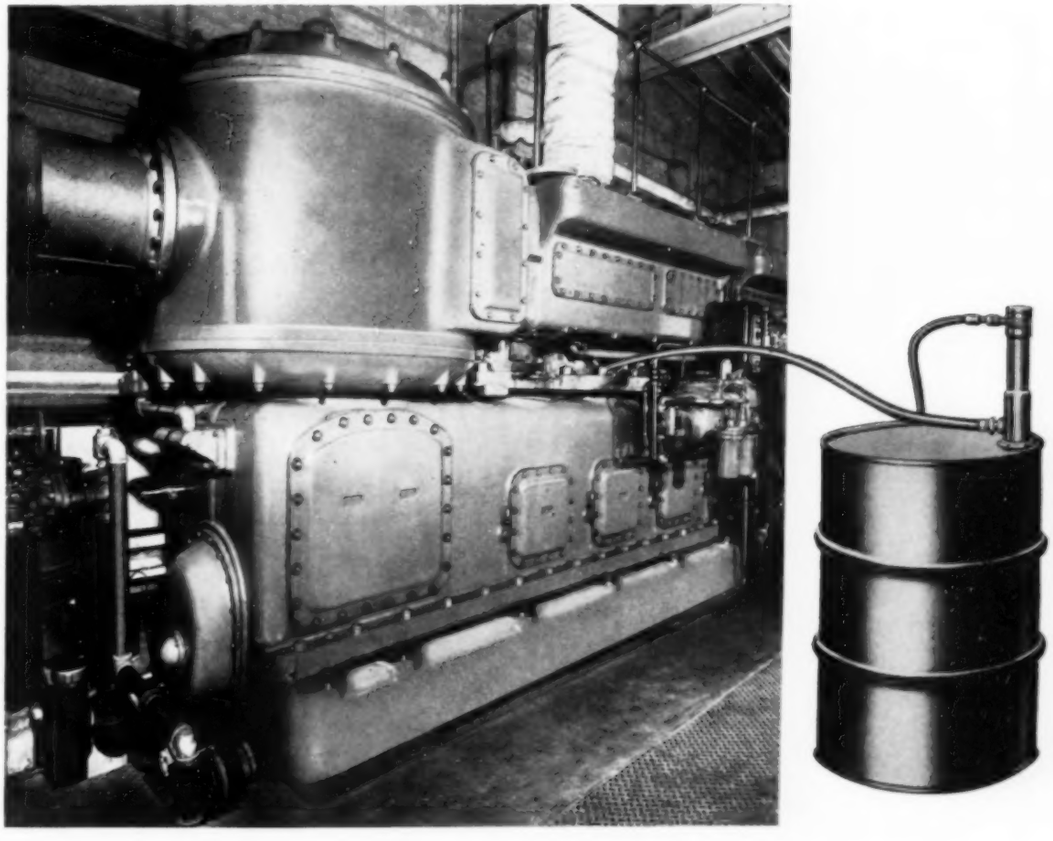
OVER in the Florida panhandle, A. P. Ward & Sons of Pensacola, has three dieselized tugs which are proving their effectiveness in the Gulf Intercoastal waterways. The tug *Philips* has a 500 hp Enterprise diesel and the *David* has an 800 hp Cooper-Bessemer. These are engaged in hauling jet fuel for the many air force bases in the Pensacola area.

Florida Representative

The appointment of James A. Robbins, as sales engineer for Florida, Georgia and the Carolinas, has been announced by the White Diesel Engine Division of the White Motor Co. of Springfield, Ohio. Mr. Robbins, a graduate mechanical engineer of Case Institute of Technology, Cleveland, Ohio, previously was associated with the engineering department of Pinellas County where he was active in the design and improvement of the St. Petersburg-Pinellas Airport. He formerly worked in the engineering and sales departments of the Aircooled Motors Corp., Syracuse, N. Y. A licensed air plane pilot since 1937, he also served on the National Aviation Committee for the Society of Automotive Engineers. He assists Mr. Julian Camp, long time White Engine representative, of Miami for Superior and Atlas diesel engines. Mr. Robbins maintains his offices in Clearwater, Florida.

NOW AVAILABLE! The Brand New **DIESEL ENGINE CATALOG,** Volume 22. This giant, 400 page, 10½" x 13½", fully illustrated reference book containing complete and detailed engine and accessory sections is the biggest and best yet. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL PROGRESS,** 816 N. La Cienega Blvd., Los Angeles 46, Calif.

Varnish Problem Vanishes!



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Let RUBILENE help solve *your* lubrication problems. Regardless of the make of your Diesel, there's a member of Sinclair's RUBILENE or RUBILENE HD family that meets your requirements. Call your local Sinclair Representative for further information, or write for free literature to: Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. *There's no obligation!*

Dino, the Sinclair Dinosaur, says:

"Send now for free literature on RUBILENE!"

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New Plant for Kittell

Kittell Muffler & Engineering, Inc., manufacturers of industrial, marine and mobile silencers and spark arrestors, recently moved all operations into a new building located at 1977 Blake Avenue, Los Angeles. The new plant is of tilt-up concrete construction and contains more than twice the floor area of the company's former facilities. There is ample room at the new site for further expansion, plus adequate parking space. According to H. A. Wiedenman, president, the increased floor space and more efficient plant layout were necessitated by the increased demand for Kittell equipment.

Diesel Cuts Compressor Fuel Costs

Bruce Page, who specializes in sand blasting and painting giant oil field storage tanks, cut his fuel bill from an average of $23 to $3.50 per day per unit when he recently applied a Cummins diesel engine to supply power for one of his compressor units. Those figures came from Page's own tests. He ran his diesel powered compressor nine hours per day for eight days on the job. With an output of 315 cu ft per minute, this unit used a total of 150 gallons of diesel fuel at an average cost of $3.50 per day. His two gasoline powered compressor units, each with less than half the output of the diesel unit, cost an average of $23 per day. Page's reaction was typical. "I'm through with gasoline powered compressors," was his pointed comment.

The unit which is performing such an outstanding job for Page is a 315 Worthington "Blue Brute" rotary compressor powered with a Cummins NHC-BI-4 diesel. Page began his industrial painting business in Illinois in 1945, operating throughout the Midwest, before coming to Texas in 1950. His Odessa office is located at 1817 North Muskingum.

Robie Retires

T. M. Robie

Theodore M. Robie, Administrative Engineer at the Beloit, Wisconsin Works of Fairbanks, Morse & Co. retired on January 1st after more than 38 years of service. After graduation from the University of Michigan with a B.M.E. degree, Robie worked a short time as draftsman with the William Tod Co. of Youngstown, Ohio on blast furnace gas engines and then joined the General Electric Co. at Erie, Pa. on their locomotive and diesel engine test floors. In 1916 he moved to New Mexico where he operated diesel stationary plants in mining operations of the Empire Zinc Co., and the Hanover-Bessemer Iron and Copper Co. World War I saw Robie enlisted in the 33rd Engineers where he saw one year's service in France, receiving his discharge in 1919. In a long and varied career with Fairbanks, Morse & Co. he has served in the experimental, service, manufacturing, sales and engineering departments, in Beloit, Wis., Dallas, New York and Chicago. He had charge of diesel sales to manufacturers of portable equipment such as locomotive cranes, power shovels and compressors and was later manager of the Diesel Sales Division of the company in Chicago. In 1949 he returned to Beloit as Manager of Quality Control and was later made Administrative Engineer which position he held at the time of his retirement.

Ted has been active in both local and national

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technical society groups. In the S.A.E. he served as Vice Chairman of the Diesel Engine Activity of the Chicago Section and was Chairman of the National Diesel Activity and Society Vice President in 1956. He is a past chairman of the Oil and Gas Power Division of the A.S.M.E. and is presently Secretary of this Division. He helped establish the Rockford Section of the American Society for Quality Control and is Chairman of the Standard Practices Committee of the Diesel Engine Manufacturers Association, also representing this group on the Standards Council of the American Standards Association. So that he doesn't get rusty in his retirement he has formed his own company—Eibor Services, Inc.—set up to handle consulting, publicity and technical writing, etc.

Executive Appointments

Earl L. Fester

Davis Spencer

Earl L. Fester has been appointed general manager and Davis Spencer sales manager of the Miehle-Dexter Supercharger Division of The Christensen Machine Company, Racine, Wisconsin. Miehle-Dexter manufactures rotary positive 3-lobe superchargers for diesel and gasoline engines and industrial blowers. Mr. Fester has been vice president and plant manager of Christensen for the past six years. Mr. Spencer was a sales engineer of the company for six months. In addition he has been serving The Dexter Company, Pearl River, N. Y. as service manager, as well as a sales manager for Dexter-Conde Dri-Air pumps. Dexter is a division of Miehle-Goss-Dexter, Inc., while Christensen is a subsidiary. Other reassignments of responsibilities at Miehle-Dexter are Thomas Kartisek to field service and sales, and Robert Kortum as a sales engineer. Carl A. Jacobsen, with the company for five years, continues as chief engineer.

British Diesel Engine Catalogue

Produced on behalf of the British Internal Combustion Engine Manufacturers' Association and prepared by D. S. Dodsley Williams, A.M.I. Mech. E., editor of *The Oil Engine and Gas Turbine*, this new (4th) edition of the Catalogue has been thoroughly revised to include nearly 3,000 British-made Diesel engines for industrial, railway and marine use with a range of power extending from 1.5 to 15,600 bhp. In addition to operational data, statistics, illustrations and descriptions of the individual engines the volume contains 48 pages of general technical information, including a special thumb-slotted Lightning Index and an alphabetical list of manufacturers.

The Catalogue also contains sections printed in French, Spanish, Portuguese and German, as well as English, and there is a comprehensive glossary in these languages of the technical terms and abbreviations used throughout the text. Printed in two colors as well as black, its size is 13¼" x 10", has 365 pages with 800 illustrations. The Catalogue is bound in Art Canvas boards with an inset panel printed in six colors. Price is £2. 15s. Od. including postage (approximately $7.70), and can be obtained from Temple Press Limited, Bowling Green Lane, London EC1, England.

Modern New Facility

The Industrial Silencer Division of the Burgess-Manning Company after six years in Dallas have moved to a new modern plant at 9207 Sovereign Row, Dallas 35, Texas, located in the new Brookhollow Industrial District. This move represents greatly improved facilities in all departments of operation and includes an air conditioned development laboratory in which studies can be made of

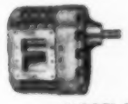
field problems relating to noise, flow of gas in pipes and liquid separation. A modern warehouse which includes efficient materials handling equipment, a direct rail spur and truck loading dock is a feature of the new facility.

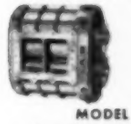
The economical, trouble-free way to boost engine power!

MIEHLE-DEXTER ROTARY POSITIVE 3-LOBE SUPERCHARGERS

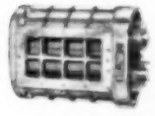
12 production models... the unit you need for the power you need

MODEL 4006


MODEL 5507S


MODEL 5511

MODEL 3210


MODEL 4012

MODEL 4009

MODEL 5514

MODEL 5518

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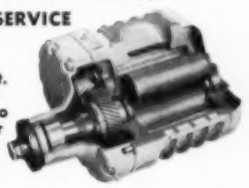
PRECISION BUILT FOR LONG, DEPENDABLE SERVICE

3-lobe design results in small cube, light weight. Helical gears and rotors machined to fine tolerances for smooth, trouble-free performance.



Miehle-Dexter Supercharger Division, Racine, Wisconsin • Telephone MElrose 4-5521 • Another Product of Miehle-Goss-Dexter, Inc.

Michigan-Ohio News

By **Jim Brown**

THE Michigan State Highway Department in December 1957 held the largest letting of highway building in its career with contracts totalling $18.9 million being awarded at one sitting. This is part of a $1¼ billion 5-year road-building program recently announced.

PENINSULAR Diesel Inc. of Detroit has sold a model 3058C GM Detroit Diesel to Martin Bros. of Benton Harbor, Michigan. The new diesel will be used to replace a gasoline engine in a model C-16 Michigan crane.

CUMMINS Diesel Michigan Inc. has installed for Marvin Belt Co. of Allen Park, Mich. a model JT-6-B Cummins diesel in a 1957 Ford C-800 cab-over-truck type tractor. Cummins Diesel Michigan Inc. says they believe this to be the first diesel installation in a Ford C-800 in this area.

DEMICHAEL & Associates of Livonia, Mich. have accepted delivery on a model 41 Northwest pull shovel powered by a Murphy model 12 diesel. The 1-yd Northwest was sold by Cyril J. Burke, Inc. of Detroit.

THE International Salt Co. of Detroit is using a new model HOD Hough Payloader equipped with a Cummins model JN-6-BI diesel in their salt mines. The sale was made by the Detroit branch of Wolverine Tractor & Equipment Company.

R. G. MOELLER Co. of Detroit has delivered to Toccalino & Sons an Austin-Western Super 88 grader equipped with a GM model 3-71 Detroit diesel. The new grader will be broken in on highway construction work in the Detroit area.

E. B. METZEN Co., gravel haulers from Detroit, are repowering a Diamond T tandem tractor with a model NTO-6-B Cummins diesel. The new diesel is rated at 262 hp and was sold by Cummins Diesel Michigan Inc.

MR. JOSEPH Crenshaw of Detroit is trying out a new TD-6 Drott Skid tractor. The new Drott was sold by the Detroit branch of Wolverine Tractor & Equipment Co.

MR. VICTOR H. Hill, a steel hauler from Roseville, Michigan is installing a 180 hp model HRF-6-B Cummins diesel in a 741 GMC tractor. The new diesel will replace a gasoline engine and was sold by Cummins Diesel Michigan Inc.

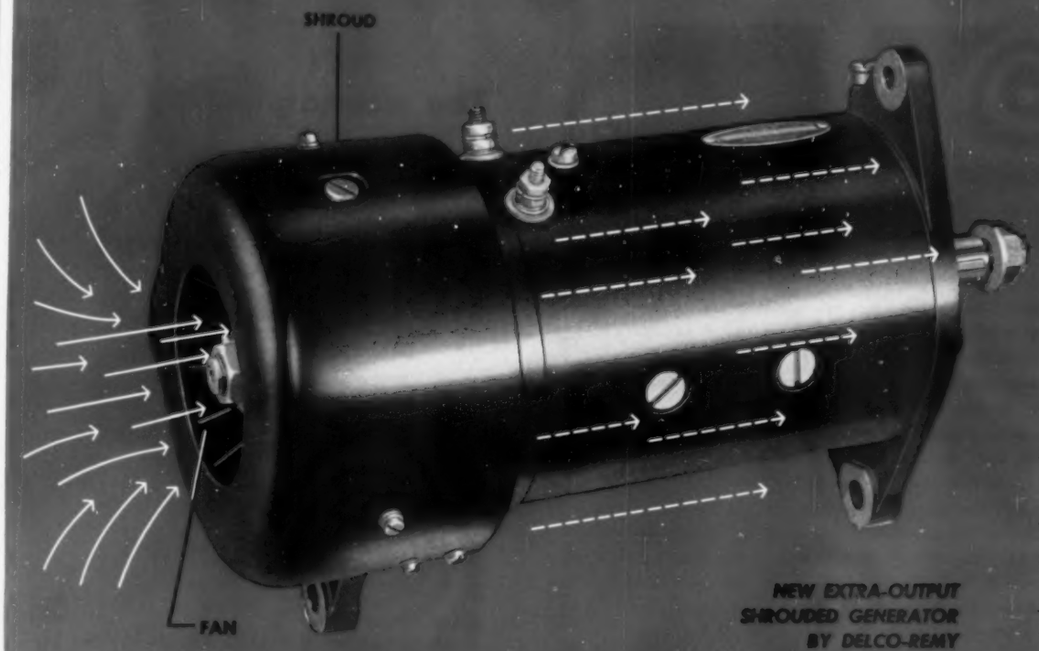
RAY C. CALL, Inc. of Steubenville, Ohio has delivered a model 4030-C GM Detroit diesel powering a new 60 kw Delco dc generator to Mr. A. E. Shreve of Grundy, Virginia.

CONTRACTORS Machinery Company, now in its 24th year as a construction equipment firm with headquarters in Grand Rapids and Detroit has recently moved both of its branches to new locations. The new address of the Detroit branch is 13200 North End Avenue. The new building here houses offices, warehouse, display and shop areas of approximately 40,000 sq ft. The new Grand Rapids building at 5311 Plainfield Ave., N.E. is approximately the same size and dimensions as the Detroit installation.

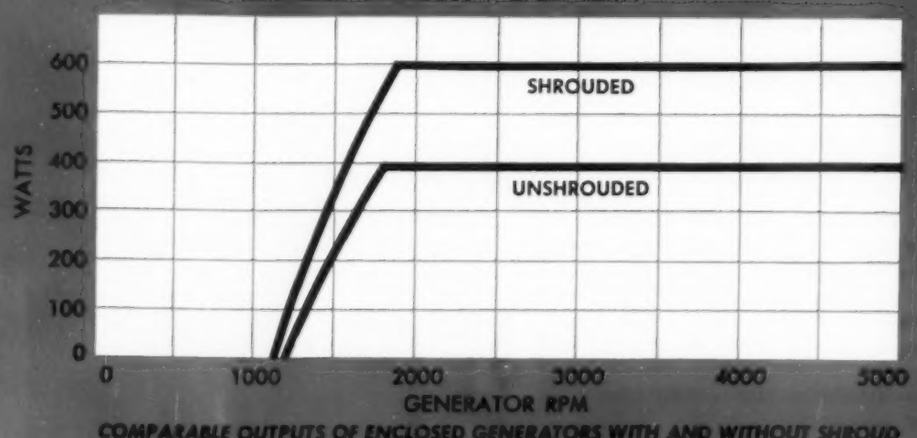
HOGUE Freight Lines, haulers of cement from Dearborn, Michigan are starting to dieselize their fleet of trucks with a model JT-6-B Cummins in a GMC FW-662 cab-over-engine tractor. The installation was done by Cummins Diesel Michigan Inc.

GREAT Lakes Engineering of River Rouge, Michigan are installing a 245 kw generator set powered by a model 12203

PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE



NEW EXTRA-OUTPUT SHROUDED GENERATOR BY DELCO-REMY



COMPARABLE OUTPUTS OF ENCLOSED GENERATORS WITH AND WITHOUT SHROUD

GM Detroit diesel in one of their boats. The sale was made by Peninsular Diesel Incorporated of Detroit.

SUNDAY Trucking Service, Inc. of Grand Rapids, Michigan are replacing an older model diesel in their model LFT Mack truck with an NH-6-B Cummins diesel. The new diesel was sold by Cummins Diesel Michigan Inc.

GENERAL Motors Research Staff has announced that it can build and test complete free piston engine systems mathematically on its Technical Center digital computer. This will eliminate much time-consuming hand calculations, test work and cut and try methods on prototype engines in the future. According to the announcement, preliminary systems were developed on the digital computer for both the XP-500 free piston automotive engine and the Cleveland Diesel engines in the *U.S.S. William Patterson*, all of which have been described in DIESEL PROGRESS.

AN Allis-Chalmers model HD16AC crawler tractor equipped with a hydraulic dozer and ripper assembly has recently been delivered to Mr. George Tripp of Pontiac, Michigan. Sale was made by Earle Equipment Co. of Detroit.

HERE'S something a little different in the heavy equipment line. A Yaeger 600 cfm compressor is being used for making snow at the Houghton Snow Bowl Ski Resort near Houghton Lake, Mich. This rotary type compressor is powered by a GM model 6-71 Detroit Diesel engine and was recently delivered by Cyril J. Burke, Inc. of Detroit.

F. F. BURNASH Construction Co. of Flint, Mich. are breaking in a new International TD-18 crawler tractor. The new tractor was delivered by Wolverine Tractor & Equipment Company.

PENINSULAR Diesel Inc. of Detroit has installed a model 6057 GM Detroit Diesel in a 1½-yd Bay City model 65 shovel for Pine Ridge Coal Co. of Detroit.

FOR THEIR Koehring shovel, Cambria Clay Products of Oak Hill, Ohio has had a model J-6 100 hp Cummins installed. The installation work was done by Cummins Diesel of Central Ohio.

Three New Representatives

Lawrence Anderson, Jack Berg and John Kerber have been added to the Chicago sales staff of Commercial Filters Corporation. The company manufactures Full-flo and CFC filtration equipment. Headquarters for all three men will be at 6409 West North Avenue, Oak Park, Illinois. Mr. Anderson will serve as a special representative on OEM accounts in addition to industrial sales. He was formerly sales engineer for the Bendix-Skinner division of Bendix Aviation Corporation. Mr. Berg has been serving as a resident sales engineer for Commercial Filters Corporation in Milwaukee, Wisconsin. He is a graduate of Marquette University and a member of The American Electroplaters Society, Master Brewers Association and American Society for Metals. Mr. Kerber came to Commercial Filters Corporation from Goodyear Tire and Rubber where he served as a field representative. He is a graduate of the University of Arizona and a member of the American Society of Lubrication Engineers.

NEW DELCO-REMY
TOTALLY ENCLOSED GENERATORS
OFFER 50% MORE OUTPUT
WITHOUT INCREASE IN SIZE

Delco-Remy's new, totally enclosed shrouded generators offer up to *50% more* output than former enclosed models of this size. They are especially designed for construction vehicles and off-the-road equipment subject to extremes of dust and moisture, or corrosive materials. Because they are totally enclosed, they are *splash-proof* and *dust-proof*.

Key feature of the new units is a high-efficiency fan mounted at the commutator end in a compact, formed steel shroud. The shroud-controlled air blast travels closely along the generator frame where it produces rapid and effective cooling . . . makes possible up to *50% more output*, without the added cost of increased frame size.

For every kind of heavy-duty operation, Delco-Remy generators provide greater power and reliability with long life. Be sure to specify Delco-Remy shrouded generators—where required—for your new equipment. Readily available in 6-, 12-, and 24-volt models for replacement application on present equipment through the United Motors System.

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

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GENERAL MOTORS LEADS THE WAY—STARTING WITH

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ELECTRICAL SYSTEMS

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Mid-West Diesel News

By L. H. Houck

RUST Const. Co., Belleville, Ill., have placed an International TD-6 with Drott loader in service. Delivery was made by Mo.–Ill. Tractor Co., St. Louis.

DENVER-Colorado Springs-Pueblo Motorway, Denver, has installed a Cummins NHHB-6 in a Flxyble Bus. Engine was supplied by Cummins Diesel Sales Corp., Denver.

GIL BOERS Equipment Co., Chicago, sponsored a preventive maintenance program covering earth moving equipment featuring the equipment of the Euclid Division of GM. The event was held at the GM Training Center in Chicago and designed as a service for Illinois Toll-Road contractors.

WESTERN MACHINERY & Engine Co., St. Louis, report delivery of two 60 kw GM generator sets to St. Louis shipbuilding & Steel Co.

HOWELL Tractor & Equipment Co., Chicago, has contracted to build new sales and service building to occupy a 4-acre site in Industrial Park and cost $400,000. Howell is distributor for International Harvester, Hough, Drott, Galion, Seaman-Gunnison and other lines.

SOY Rich Products, Inc., Wichita, Kan., has repowered a White 9000 TD with a 175 hp JT-6-B Cummins diesel from Cummins Sales & Service, Ft. Worth, Texas.

GMC SHOWED its new highway tractor with air suspension and diesel engine at the Chicago Auto Show in January. The engine is a 6-71 GM 2-cycle diesel, 190 hp. The new rig weighs only 11,000 lbs. ready for the road, including 5th wheel and 100 gallons of fuel, ICC equipment and driver.

MEYER Excavating Co., St. Louis, has taken delivery on an International TD-9 Tractor with Drott loader from Mo.-Ill. Tractor Co., St. Louis.

MERINO Elevator Co., Merino, Colo., has purchased a 175 hp JT-6-B Cummins from Cummins Diesel Sales Corp., Denver, for repowering a truck.

MAGNA Cove Mining Co., Potosi, Mo., miners of barite have placed an International 65 Payloader in service from Mo.-Ill. Tractor Co., St. Louis. Power is a Cummins NT-6-DI, 250 hp diesel.

CUMMINS Diesel Sales, Denver, delivered a 220 hp NHB-600 to Ray Reed Service, Greeley, Colo., for repowering a Kenworth 521 truck.

LEONARD Bittle, Anna, Ill., has taken delivery on an International TD-9 Tractor with Drott loader for use in general contracting work, from Mo.-Ill. Tractor Co., St. Louis.

MURPHY diesels star in the rock plant of Riddle Quarries, Salina, Kan., where 4 power shovels, 3 secondary and 1 jaw crusher primary plant, are powered by Murphy diesels with 8 in use. Big job of the quarry is supplying blanket and riprap rock for Lovewell Dam of the Bureau of Reclamation.

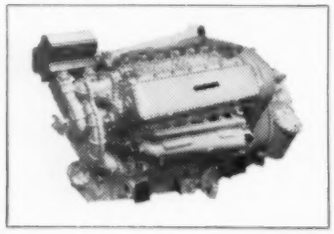
McCALMAN Const. Co., Danville, Ill., used a Model 40 Marion shovel with Allis-Chalmers diesel, on a $540,741 contract for a new bridge to carry U.S. 150 traffic over Vermilion river at Danville.

REICHERT Mining Co., Piedmont Mo., iron ore miners have placed a TD-14 IH tractor with Drott loader in service. Delivery was made by Mo.-Ill. Tractor Co., St. Louis.

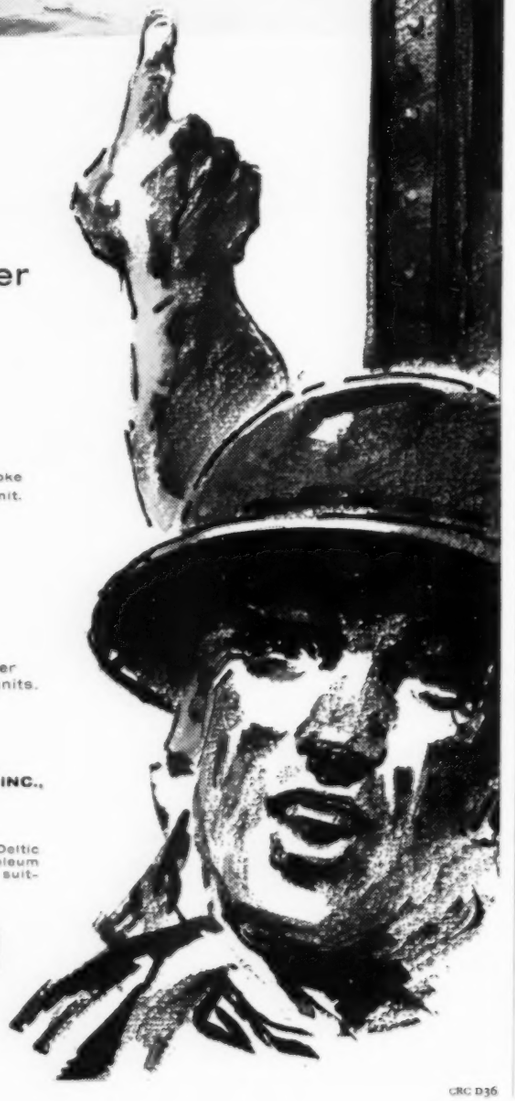
G. W. EDWARDS, North Little Rock

'RIGHT ON SCHEDULE!'

—with NAPIER DELTIC power



Napier Deltic 18-cyl. opposed piston, 2-stroke diesel marine power unit.



Deltics—Napier-engineered, high speed diesels—reduce shore-to-rig crew transportation times by 50% and more.

Deltics pack a bigger punch into a smaller space than any other marine engine—they are 25% the size of conventional diesel units.

Deltics can cruise a 50-passenger launch at 35 m.p.h. with a comfortable reserve of power in hand.

For fast, reliable, low-maintenance marine transportation, Deltics—9 or 18 cylinders—can be integrated into your design calculations. For more information contact **NAPIER ENGINES INC.**, 909 Dupont Circle Building, Washington 6, D.C. Telephone : North 7-0146.

The boat illustrated is one of the fleet of Thornycroft-built, twin Deltic powered, 50-passenger crew launches operated by the Shell Petroleum Company on Lake Maracaibo. Plans of Deltic powered crew boats suitable for Gulf operation are available.

NAPIER Deltic marine diesel

FOR THE MOST POWER IN THE LEAST SPACE

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CRC D36

excavating contractor, has placed two Case TerraTracs in service on his overpass job between Little Rock and Benton. One is a Model 1000 with dozer and the other is a Model 800 with similar equipment.

J. E. LATTA Const. Co., St. Louis, has added an IH TD-14 tractor with Drott loader to its large fleet of diesel-powered equipment. Delivery was made by Mo.-Ill. Tractor Co.

J. B. MICHAEL & Co., Memphis, has a good diesel spread on its Shelby county SH 14 highway job. Four Caterpillar DW21 scrapers, a Cat D9 with torque converter for pusher, 2 Allis-Chalmers HD20 tractors; 2 Cat No. 12 motor graders and 2 Cat D8's, plus a Cat D6 for pulling sheepsfoot rollers.

GARY RINEY, Mexico, Mo., has taken delivery on a TD-24 IH tractor from Mo.-Ill. Tractor Co., St. Louis.

MORE diesels for coal mining. Forsythe-Carterville Coal Co., Carterville, Ill., have added a new International TD-9 tractor with dozer.

Plan To Attend The ASME Gas Turbine Conference

The first International Gas Turbine Conference and Exhibition, sponsored by The American Society of Mechanical Engineers, will take place March 2-6, 1958, at the Hotel Shoreham in Washington, D.C. Twenty-six papers on gas turbine design and application will be presented by their authors at nine technical sessions. They cover design, application and actual performance of the turbines in industry, armed services, aero and automotive use, economic considerations and future outlook. The authors are from all parts of the United States, from France and from England.

The concurrent exhibition, international in scope, is designed to cover worldwide developments and applications of turbine power. In addition to the technical events, there will also be a display of operational gas turbine equipment at the Naval Gun Factory on March 5. Featured are gas turbine installations in generator drives, ship and air propulsion, fire pumps and others. Also scheduled for March 5 is the Conference Banquet, at which James N. Landis, President of The American Society of Mechanical Engineers, will be a speaker and W. A. Dolan, Commander of the Puget Sound Naval Shipyard, will serve as toastmaster. A full program has also been planned by the Washington Section of ASME for the feminine members of attendees' families. It includes a visit to Congress in session, an embassy tea and a tour of Washington.

Additions to Sales Force

Announcement of recent additions to its sales organization is made by Quincy Compressor Company, Quincy, Illinois. The report from the company indicates new sales offices are now open in Charlotte, North Carolina and Cincinnati, Ohio, and that a new representative has been added to its Chicago office staff. In charge of the new Quincy sales branch in Charlotte, North Carolina, is Bill Yoe, formerly with a sales promotion firm in Quincy. He will serve the company's customers in North Carolina, South Carolina, Virginia and the Knoxville, Tennessee area. Operating out of the new Cincinnati office, Lawrence Wickliffe also formerly of Quincy, will be active in southern Ohio, West Virginia, Kentucky, and the Nashville, Tennessee area. Chuck Long, formerly of Decatur, Indiana, has been appointed as the new Quincy representative working out of the company's Chicago office. He will serve Quincy customers in northern Indiana, northern Illinois, and southern Wisconsin. Before joining the Quincy organization, Long was active in farm equipment sales.

WINSLOW
Full-Flow
FILTERS

Case History Report No. 36 Shows Why Engines Protected By WINSLOW FILTERS Last Longer

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Fuel Filtration

Central Texas Gravel Company further protects its powered equipment by Winslow Fuel Filters, which remove moisture, acid, dirt and other impurities from fuel oil, to protect working parts and improve engine performance.

Only Winslow Filters offer CP* Protection

Winslow patented CP* (Controlled Pressure) elements are designed to continuously self-adjust the pressure within the filter and allow for a full stream of filtered oil without opening by-pass valves. This is accomplished through the dual flow capacity, with two types of material.

These two Euclids were put into service by Central Texas Gravel Company in April, 1950. Winslow full-flow filters were installed to replace the original equipment; after which, oil was changed every 120 hours, and elements every 180 hours, instead of at 60 hour intervals. Both Euclids have GMC diesel engines.

No engine repairs whatever were required until June, 1956. In a six-year period, the engines were operated more than 15,000 hours under severe weather and dirt conditions. In 1956, one engine was replaced and the other is still in operation, without overhaul.

Contrast this record of engine performance and life with that of your equipment. This is only one example of the important savings made by the use of Winslow Full-flow Filters. You can increase engine life and reduce maintenance costs with Winslow Filters—because they keep all the dirt, moisture and other contaminants out of your engines, under any conditions. Only Winslow CP* filters can give you this protection. Let us send you information on filters and elements for your equipment.

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Diesels All Around The World

By F. Hal Higgins

INTERNATIONAL diesel engines with 12-volt push button starters are powering a new line of Schramm compressors just announced as that company's *Unistage* air compressors. They are mounted on both steel and rubber, as well as a skid model. There is also a truck mounting model. Engine is the UD18-A.

FARM land values have been inching up, averaging 7% above a year ago in Oregon. This reflects the purchase by prosperous business farmers of more land to increase the efficiency of their operations by use of bigger equipment including diesel tractors.

THE J. I. CASE Co. Pty. Ltd. is the name of the Case subsidiary company in Australia just formed. David Shearer is manufacturing the Case pick-up baler for the company in that area. Three sizes of Case diesel tractors are offered: the 300, 400 and 600 models.

THE NEW South Wales Soil Conservation Service has launched a program for increasing pasture by treating the soils to deep ripping to get more water absorption. A 40 hp Oliver BD crawler tractor is pulling a 3-time Britstand automatic ripper.

THE SUNSHINE Massey-Harris line in Australia has added a new diesel tractor, the 555 model rated 54.5 hp on the drawbar. It is a 4-stroke, 4-cylinder job. Sunshine is the Australian factory of the famous Canadian Massey-Harris-Ferguson organization.

GIANT air tires for the big road building machines get bigger and bigger to give them traction and flotation. Firestone recently turned out one 9 ft tall and weighing 3,355 lbs at its Plant I for one of these late model wheeled diesel jobs.

IN DALLAS water sold for 50 cents a gallon jug during the drought early last year and more than 1,000 U.S. cities and towns were forced to restrict water use during dry spells while gardens and lawns browned and baths were rationed. Hence, the rash of talk in and out of print about desalting the ocean and solving the whole water problem in one full swoop. But Arizona's Valley National Bank reminds its customers that a practical use of all that ocean water is a long way off and additional reservoirs to catch the rains and melting snows will be the practical answer for probably another 20 years or more. That means lots more work for the big diesel equipment that is already doing a giant's job in dam construction and levee building.

BIGGER tractors and diesel-powered dirt moving equipment is forecast by both U.S. and European engineers and manufacturers. Peterson in the San Francisco Bay area, for practical example, is promoting the tandem Cat push of three scrapers. In two trials, one in good traction and the other in poor traction, Peterson's engineers worked out a table to show savings of 1.23 and 4.80 cents per yard for the 2-Cat push. One big contractor from Southern California who has the biggest cut on Highway 40 in the approach to the Carquinez bridge, has been using a single D9 pushing two scrapers on a down-hill pickup.

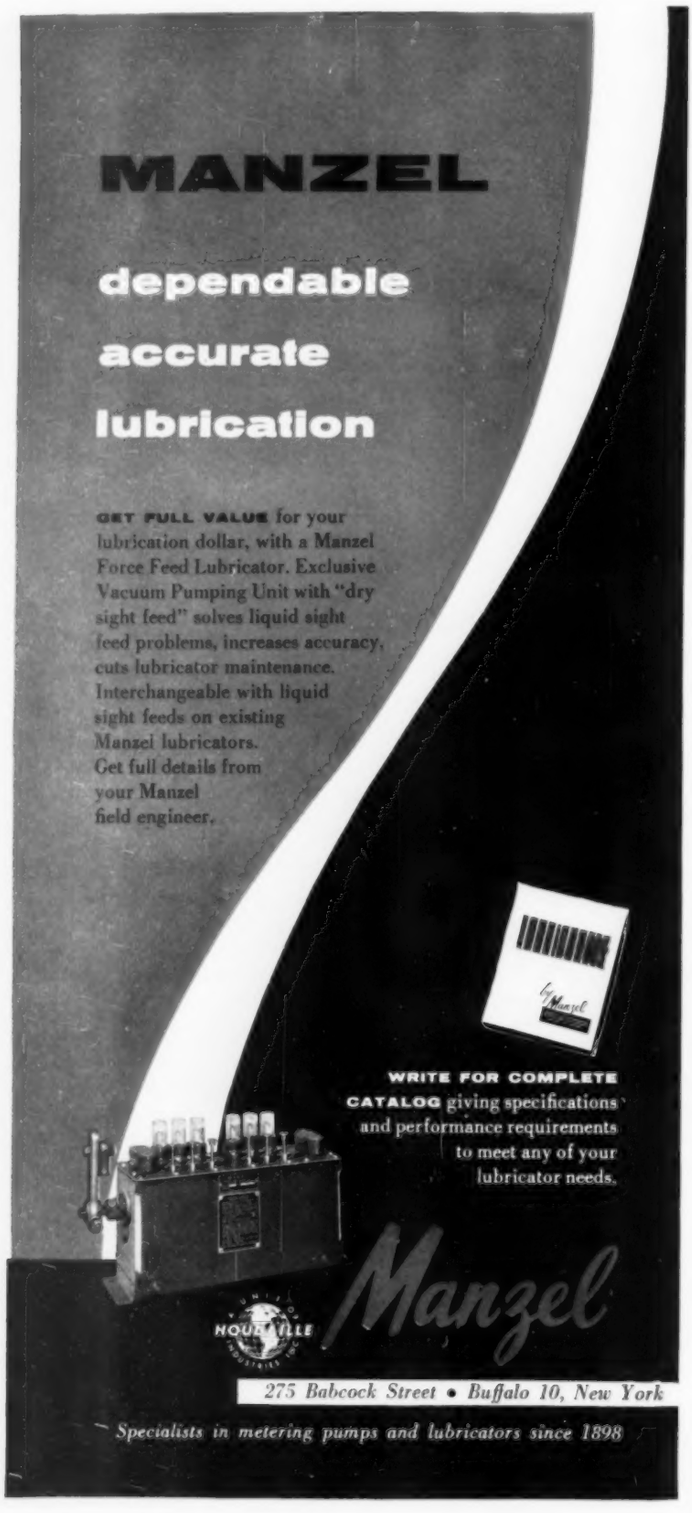
FRONT-END loaders are hatching out all over the map wherever a manufacturer has a tractor or other piece of mobile equipment. The Thew Shovel Co. Lorain, Ohio, is out with its Mono-Loader. First model ready is a 4-wheel drive with Allison torqmatic 3-speed power-shifted full reversing transmission, and integral torque converter with 2.5 to 1 multiplication ratio. Diesel engine is Cummins JF-6-BI.

BRITISH tractors are making a new sales record both at home and abroad. Standard Motor Co. produces the Massey-Harris-Ferguson abroad, but is now shipping British-made components to its Detroit plant for the North American market. Ford has spent 16.6 millions tooling up for its new tractor at the Dagenham, England, plant. International Harvester, Allis-Chalmers, Nuffield, David Brown and Caterpillar are all turning out English-built tractors. Brown and Nuffield are originally British, of course. But they are all going global these days with factories where they can take advantage of both cost of labor and materials and access to markets.

FARM TYPE diesel wheel tractors are winning a place in small industrial operations such as stripping overburden from gravel pits, says *Rock Products* in telling how an aggregate operator near Denver has solved his problem. The Deere diesel tractor moves overburden at the rate of 90 to 140 cu yds per hour at 6 to 7 cents a yard, including labor and depreciation. On a recent test, hauling 1,950 ft one way, the outfit moved 74 yards per hour at 7.2 cents per yd. The scraper is the elevator type of 8 yards, and side boards can be used if wanted.

THE "battle of the bugs" via chemicals sprayed and dusted from planes, gas and diesel ground rigs and by hand is getting bigger and more complex every year. In 1956, nearly 17 million gal. of liquid and over 7 million lbs of powder insecticides were sold and "shot" at the many pests, says the Chemical Specialties Association. In the big crop areas of the West, diesel tractors, both wheel and crawler, were the big artillery pieces in this never-ending war.

CONSUMPTION of frozen concentrated orange juice and lemonade concentrate were substantially up last year, according to the USDA Marketing Service. Household consumers bought 5.3 million gal. of frozen concentrated orange juice in September last. The mechanical refrigerator cars of the railroads are doing a great job in developing this market for citrus fruit. Another 1,000 diesel-refrigerated cars are being built by Pacific Fruit Express with GM and Witte supplying the engines.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A. B. C. HANSEN Comp. A/S, Copenhagen, Denmark, demonstrated a new sugar beet harvester at the recent trials in England. The firm builds five types of diesels ranging from 5 to 240 hp.

IRELAND has recently taken 100 Combi combine harvesters powered by Mercedes diesel engines. Thirty of these same units went to Eire last year. Engine is 34 hp, and width of cut 6 ft, 3 in.

BOEKE & Huidekoper, Ltd., Haarlem, Holland, whose potato harvester made such a fine showing in the recent London demonstration, informs your DIESEL PROGRESS Reporter that they have had fine sales with increasing world interest in both their potato harvester and their Hinde side delivery rake of the type known in this country as the Morrill and in Great Britain as the Finger Wheel. Practically all are being powered by the European diesel tractors.

THE BUILDING Exhibition at Olympia, London, brought out a range of equipment that had the International and Allis-Chalmers models we saw at the Chicago road show. International showed both its Drott and Hough models. Allis-Chalmers its HD 6G. David Brown, which has been on the Pacific Coast and in Canada for the last two or three years, showed its 50 and 30 hp tracklayetes with 6 and 4 hp diesels. Mackay of Feltha made that firm's first appearance in this field with its Tractomotive TL 12D tractoloader on a 4-wheel drive unit with 70 hp 6-cylinder diesel and hydraulic torque converter that gives it a speed up to 25 mph. Fiat had its CI 60 tractor. Thwaites Engineering Co., Ltd. was there with its Tusker dumper powered by a Petter AVA 2 twin-cylinder air-cooled diesel.

THE 1,000th British-made International Drott skid-shovel was shown by International Harvester Company of Great Britain Ltd. in the biggest display of construction equipment ever shown in Great Britain. Some 400 government officials, members of the services and contractors were guests of the company at this demonstration. The Rolls Royce diesel-powered TD18 that is to be built at Doncaster in 1958 was introduced for public view.

CROP yields for 1957 set an all-time high. More and better application of fertilizers is one of the answers. California farmers are using 3½ times more commercial fertilizer than they were using in 1940, according to the California Fertilizer association. Bigger farms and tractors in many areas of the U.S. was another reason with the bigger tractors trending to diesel east of the Rockies to follow the lead of the West in this direction.

ALLIS-CHALMERS' new models D17 and D14 tractors on the market in diesel drive and are designed to span tall crops. They both have the quick-shift on-the-go in two speed ranges. Both have roll-shift front wheels and power-shift rear wheels.

JOHN DEERE Research and Engineering Center near Waterloo, Iowa, was recently opened. A year-round never-ending program of research, and testing will be carried on to give the famous century-plus line the quality to hold and increase its place in the farm and industrial fields.

DEERE & CO. is meeting the demands of U.S. farmers for cost cutting of row crop production by developing bigger tractors to carry 6-row planting and cultivating attachments on the tool bar of its tractors.

FORD'S NEW Dexta is powered by a 3-cylinder diesel that develops 32 hp at 2,000 rpm. This Dexta is to be a workmate to the Fordson Major diesel, giving Ford a pair of diesel wheel tractors for the world markets.

CARRYING ON A PROUD TRADITION

M/V SALLY POLK is the 7th Cleveland Diesel-powered towboat in Canal Barge Company's fleet

Canal Barge Company, Inc., is a leader in furnishing low-cost transportation along the inland waterways of America—with shipments surpassing one billion ton-miles in 1957.

Newest vessel in Canal's fleet is the SALLY POLK—seventh of its modern towboats to be powered with Cleveland Diesel engines.

Wherever towing service requires dependable, efficient power, Cleveland Diesel engines are first choice today.

Canal Barge Company's first Cleveland Diesel-powered vessel BULL CALF helped establish a new era in inland water transportation when it was launched in 1939.

The new M/V SALLY POLK shown pushing an integrated tow. This towboat was designed and built by Dravo Corporation, Pittsburgh, Pa.

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San Francisco, Calif., 870 Harrison St. Tel.: Douglas 2-1931

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Wilmington, Calif., 2724 Foreman Ave. Long Beach, Calif. Tel.: Terminal 4-4098

Eastern Diesel Observations

By Arnold B. Newell

We usually think of the municipal power plant as a way to bring to a town the profit normally made by a private utility. That in itself is a strong municipal ownership incentive. Politically it is advantageous as it reduces tax rates. In some areas the permissible amount of taxation is not enough to run the town and other sources of revenue must be found such as a water works, charge for sewage disposal, garbage collection, parking meters, licenses, fines, etc., but these are seldom enough to meet current expenses.

The municipal power plant can, on the other hand, be more than adequate. In one small city I visited recently there was no town taxation and yet the schools, city maintenance, police force, fire protection, parks and recreational facilities were excellent. The city-owned electric utility paid all town expenses.

In another community the municipality set up a non-share, non-profit corporation to run the electric department independently of the administration. The town leased the power plant to the operating corporation and in this way circumvented restriction on supplying money accumulated out of profit to help business, industries and colleges to be established in the town.

The diesel electric plant is paid for by the operating corporation without the town having to issue bonds. The plant capacity is 1 kw per person—with 10,000 kw for a population of 10,000.

The book value of the diesel utility has increased in 32 years from a quarter of a million to over $1,500,000. During this period franchise payments and additions to the plant have totaled over $2,500,000. Various aids to industries, business and schools have amounted to over half a million.

Perhaps the most interesting phase of this situation is that the plant assets can not be diverted by the town to uses other than the electric system's own betterment. The funds necessary for proper maintenance and adequate growth can not be taken from it. The corporation operates at maximum efficiency with a non-salaried board of directors made up of prominent business men of the town. So far as I know this is the most unique method of operating a city owned utility to be found anywhere in the country. It would solve many municipal problems if it were employed in other communities.

Keep an Eye on Rochester

The impact on the diesel industry of completion of the St. Lawrence Seaway may not be fully appreciated. The first inclination is to contemplate the probable building of motor vessels for Great Lake trade via the Seaway. The overall diesel potential is in excess of the somewhat uncertain trend in ship powering.

In earlier reference to the Seaway I have mentioned the essential element of channel deepening to permit ships of deep draft to navigate the Lakes. Now a five year program to cost $136,000,000 has been started. In a program of this magnitude a vast amount of marine diesel equipment will be required and much of it must be built. This will include dredges and tugs, drilling barges and a vast miscellany of feeders. Work on the Seaway has already caused existing equipment to gravitate to it with diesels ranging from brand new ones to some that are over a quarter of a century old.

The long-range outcome is more important. What will happen on land deserves careful consideration now.

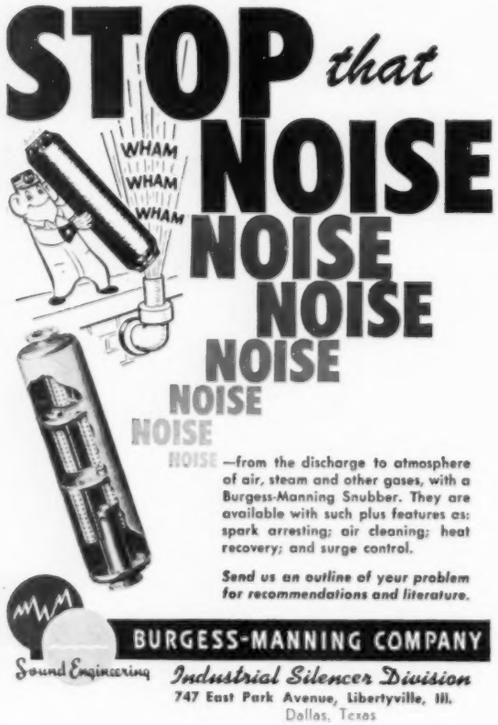
There are four ways that shipping may be served. One is by barges and tugs, another is by rail, a third is by highway transportation, the fourth is by pipeline which we may or may not have to disregard.

The three methods of transportation that we know will be employed are dieselized. To serve shipping on the lakes more tugs and barges, locomotives and highway tractors will be needed.

Concentration of such activities will occur where tonnage volume can be most readily moved to shipside. The Seaway will take ships of 27 ft draft. This is more than the depth of the Welland Canal.

It would therefore appear that until the larger ships can load in all lake ports, the points below the Welland Canal such as Rochester may expect proportionately more growth of feeder transportation facilities than at other places on the Great Lakes. The area is rapidly becoming a center of highway transportation and more rail connections to shipside must be built.

A stern chase is a long chase, according to seafaring tradition, and ports on the lakes that can become active before the channel deepening is completed are likely to obtain and hold the lead. It is therefore to be expected that Rochester, New York will become a center of pur-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DIESEL ENGINE CATALOG

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People who sell, people who buy, people who use diesel engines need this new, fully illustrated, up-to-the-minute volume. It has been completely revised and expanded. Orders are now being accepted for this latest edition. Price $10.00 prepaid.

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chase for a vast amount of dieselized equipment for use afloat and ashore, on rails and highways, for present and future use. The area is worth watching.

Overloading

There is a strange paradox in diesel operation. Despite warnings, advice, instructions, and lectures on the dangers of overloading, some operators continue doing it. The owner's closest association with the diesel manufacturer is through the service department and all service managers fear the outcome of overloading.

On the other side of the picture we find extremely cautious owners who will buy more horsepower than the job calls for.

They are often told by sales engineers that engines will pull up to their full rated power and to under-load it is neither necessary nor economical.

I was criticized by a sales engineer for writing an article giving a low rate of actual fuel consumption of a diesel he sold because, in his opinion, his competitors would point to my article as evidence that the engine could not pull full load. Fear of his competitors had caused this man to lose his sense of values.

There is no evidence of diesel purchasers being advised to overload their engines, but when they are told they may load them to the hilt continuously, it is tantamount to an invitation to overload.

We find a somewhat similar situation in use of power transmissions. Instead of buying a size barely large enough for the job, experienced operators often take one of extra capacity, preferring a slightly higher first cost to foreshortened life.

Since the problems associated with overloading have not been solved in half a century of diesel operation they may never be fully solved.

Perhaps a better approach to the process of education would be one to cut all the long lectures on details of the danger of overloading and eternally reiterate "Overload your engine and you'll pay through the nose for it."

The Causes of Boat Vibration

There are many misconceptions regarding the reason for vibration in boats and ships of all sizes. Solutions to these problems are so complex that none but the most expert naval architect and marine engineers should attempt analysis.

Vessels powered by steam turbines vibrate and yet the turbine and the components of the mass elastic system and the propeller must be in perfect dynamic and static balance.

When the experts start searching for the causes of ship or smaller boat vibration they examine the hull form and construction, the proximity of the propeller to the hull, the design of rudder, struts or skeg. They check such items as propeller diameter and pitch and they recalculate the natural periods of vibration of the hull. It is therefore foolish to bring engines alone into discussion of vibration of boats or ships of any kind for engines are seldom at fault.

Improved High Altitude Performance

The reduction of engine horsepower caused by operation at high altitudes can now be eliminated on the Caterpillar D6 Tractor by the use of a Normalizing Kit recently made available by Caterpillar Tractor Co. The D6 Tractor thus joins the D7 and D8 to become the third machine in the Company's line to be provided with the Normalizing Kit. The new kit, which consists of a turbocharger and all manifolds needed to mount it on the tractor engine, overcomes the cause of high altitude power loss—insufficient oxygen to permit complete combustion of fuel. The turbocharger delivers air to the inlet manifold at greater than atmospheric pressure, thus permitting complete fuel combustion and restoring "sea level" horsepower up to 10,000 ft altitude. For example, when operating at an altitude of 8,000 ft, the normalized D6 will operate at the machine's full sea level rating of 90 hp, while the standard D6's capacity at the same altitude would be 79 hp.

The Normalizing Kit does not increase the horsepower of the tractor while operating at sea level, but is effective only in providing the needed oxygen at high altitude to burn the same amount of fuel as at sea level. To assure that proper governor setting is maintained, the governor housing is sealed when the normalizing kit is installed. The kit is available either for factory installation on new D6 Tractors, or for field installations on machines already in operation.

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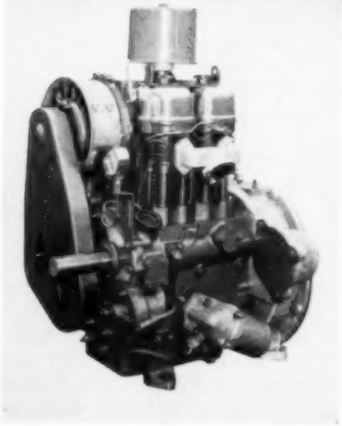
Go ahead and put the cooling water down the drain—shoot the exhaust to clear blue yonder and burn fuel under a boiler to heat the plant instead of recapturing half the heat in the fuel by harnessing the exhaust and the heat from the jackets.



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West Coast News

By James Joseph

TO COMISION Federal de Electricidad, Mexico, two 3500 hp, 10 cylinder model 31A18 Fairbanks-Morse diesel engines.

FOR THE 75 ft purse seiner *New Roma*, Monterey, Calif., a GM 6-110 engine swinging a 54 in. x 45 in. prop thru 4.5:1 reduction. Sale via Crofton Diesel Engine Co., Inc., San Pedro, Calif.

POWERING Richfield Oil Co.'s 40 ft steel crew boat are two turbocharged GM 6-71s, the boat working out of Santa Barbara, Calif.

SOLD TO West Los Angeles' Leich Sales Corp., a Fairbanks-Morse model 49B4 1/2, 180 hp, 6-cylinder diesel engine.

AS SOURCE of ship's power aboard the new tuna clipper *Mary Barbara*, built by San Diego's National Steel and Shipbuilding Corp., are two Murphy model 24 diesels (6 cylinder, 4 cycle, 191 hp at 1200 rpm) driving Electric Machinery generators rated 156 kva, 240 volts.

ALMOST AS *Mary Barbara* slid down ways, the American Tunaboat Association in report to U.S. Tariff Commission noted decline in clippers from 210 boats in 1952 to but 153 in 1957 with but 146 expected to be fishing during 1958.

DELIVERED to American Independent Oil Co. San Francisco, Calif., a Fairbanks-Morse Model 49B4 1/2, 180 hp, 6-cylinder diesel.

INSTALLED in the 40 ft bait boat *Paloma*, owned by Wilhelm Kellerman, and fishing out of Seattle, a GM 3-71 swinging 34 in. x 25 in. wheel, thru 3:1 reduction.

FOR THE Yacht *Pursuit* (William Enterprises, Beverly Hills, Calif.) a GM 4-51, driving 22 in. x 17 in. prop thru 2.5:1 reduction.

POWERING the Humble Oil Co. crew boat *John S. Bell*, tending offshore oil rigs, are two GM 6-71s swinging 28 in. x 32 in. wheels thru 2:1 reduction, achieving cruising speeds to 30 mph.

DELIVERED to Pangintch, Utah's A. L. Elmer Co., a 5 1/4 hp Model 45B3-1/8 Fairbanks-Morse diesel generating set.

DIESELIZING the modern sportsfishing boat *San Pedro Special*, operating out of San Pedro's Norm's Landing is a GM 6-110 driving 44 in. x 41 in. prop thru 3:1 reduction, with speeds to 12 knots.

GENERAL Construction Co. Portland, Oregon, has taken delivery on a 6DC-1879 Allis Chalmers diesel (900 rpm with Twin Disc Clutch) repowering one of their Bucyrus shovels. Sale through Hamilton Engine Sales, Inc., Portland.

FOR THE purseiner *Sealanes*, owned by Rosario Lauro, San Pedro, Calif., a GM 6-110, swinging 40 in. x 32 in. wheel thru 3:1 reduction.

INSTALLED in Los Angeles Harbor Dept. passenger ferry *Ace* is a GM 4-71 (46 in. x 39 in. prop, thru 4.5:1 reduction).

A MATCHED pair of GM 6-110s power Santa Catalina Steamship Co.'s *Blance W*, swinging 48 in. x 48 in. propellers.

TO HONOLULU's P. S. Pell & Co., a 5 1/4 hp model 45B3-1/8 Fairbanks-Morse generating set.

SAN PEDRO'S Crofton Diesel Engine Co., Inc. has sold two Turbocharged GM 6-71s for installation in deluxe sportfishing boat *Webfoot*, which swings 28 in. x 30 in. wheels through 2:1 reductions.

FOR RICHARD Stuart's motor sailboat *Gracious Me*, a GM 2-71. Boat operates out of Newport Beach, Calif.

POWERING 42-ft tug *El Segundo* is a GM 4-71 driving 3-bladed Michigan propeller (36 in. x 28 in.) through 3:1 reduction. Tug handles oil tanker lines.

Director of Manufacturing

Appointment of H. Douglas Rowe as Director—Manufacturing at Cummins Engine Company has been announced by E. D. Tull, Cummins Executive Vice President. Mr. Rowe, 39, formerly was General Manager of the Ford Motor Company's Brookpark Road engine plant in Cleveland, Ohio, Ford's largest engine plant. He assumed direction of manufacturing and production functions at Cummins on January 2, 1958. Rowe's responsibilities at Cummins will include membership on the Company's Executive Committee.

Phil Jackson Retires

Philip B. Jackson long associated with the development of transportation applications for aluminum, retired from Aluminum Company of America February 1. A veteran of 34 years with Alcoa, Mr. Jackson joined the company in his native city of Buffalo, New York, in 1923, to help design the chassis for the *Alcoa Six*, one of the first aluminum automobiles. Previously he had been a design engineer for Pierce-Arrow Motor Car Company, where he assisted in designing the world's first locomotive diesel. Mr. Jackson's continued research in the diesel field brought him to Cleveland, Ohio, where, since 1927, he specialized in the application of aluminum to stationary, marine, locomotive, truck and tractor diesel engines. He and his wife, the former Helen Lytle, have moved to Weaverville, North Carolina, to a mountain-top home they own.

Joins Napier Board

Raymond J. Pflum, who recently retired from the United States Navy with the rank of Rear-Admiral, has been elected Vice-President Sales and a member of the Board of Directors of Napier Engines Inc., of Washington, D.C., U.S.A. Mr. Pflum, an engineering graduate of the Illinois Institute of Technology, held a number of planning, operational and administrative appointments in aviation during his period of naval service, and was cited for heroic action in combat during World War II and during the Korean War. He was awarded the Navy Cross, four distinguished flying crosses and five air medals. In addition to his naval background, Mr. Pflum flew as a pilot with Eastern Airlines and Pan American Airways, served on the staff at the University of Tampa as an instructor in Aeronautical Engineering, and was an engineer on the Great Lakes to Gulf Waterways System.

Napier Engines Inc. was formed in July, 1957, to handle Napier's growing business interests in the United States of America. Its president is H. Sammons, the Managing Director of D. Napier and Son Ltd., London. The other members of the Board are: Sir Archibald Hope, R. M. Hilary, and J. C. K. Shipp, who is also Executive Vice-President. Although Mr. Pflum will be concentrating initially on aviation matters his activities will in due course range over all Napier products in the U.S.A.

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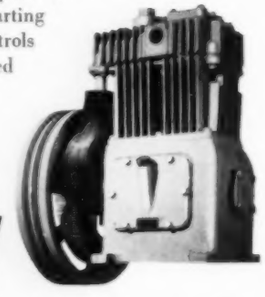

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Inland River Reports

By A. D. Burroughs

THE brand-new *Cecilia Seley*, big 200 by 45 ft towboat completed at Dravo for Sealy Power, Inc., is the newest bidder for bigness with its claim for 6,000 hp. Similar to MVBL's *A. D. Haynes II*, *Valley Transporter*, and *Valley Voyager*, all equipped with Nordberg Supairthermal V-12's, the new towboat is scheduled for service as an alumina pusher.

BIGNESS has its boosters, but towboats with less hp play an important role, too. The *Rocket*, built last year by Huckabee, Inc., is one example, using the 600 hp supplied by a pair of Atlas engines for service with Smith Towing Co., Pitts.

VIRGINIA Z, newest addition to the Charles Zubik fleet, receives favorable comments for duty seen in Pittsburgh waters with 700 hp from two Cooper-Bessemer engines.

THE *Paul III*, pusher for Kansas City firm, Massman Construction Co., is another fine example of profitable performance from smaller diesel engines. The 45 by 14 ft craft, built last year by Missouri Valley Steel, Inc., Leavenworth, Kan., receives 240 hp from a GM engine.

TWO Cummins engines provide the 750 hp for the still-new *Aubrey Saucer*. The 60 x 20 ft twin-screw towboat, a recent production at Saucer Marine Service, Inc., New Orleans, is in active service for owners, Cairo Harbor Service.

THE PATTON-Tully Transportation Co., Memphis, Tenn., built, owns, and operates the log-pusher, *John Morris*. This new towboat measures 90 by 24.5 ft, and is equipped with two Caterpillar engines providing the 1,000 hp.

TWO Superior engines, model 40-52X-8 will supply the rated 1,066 hp for the new towboat being built at Hillman Barge and Construction Co., Pitts. The craft, reportedly a near-twin to the popular *Henry L. Hillman* will measure 118 by 27 ft.

WESTERN Gear Corp. Model 210 MGV-220 reduction gears plus a new pair of Enterprise engines give new future and power for the towboat, *Caleb H.* Riverfolks know the craft as the *Elmore Foster* operated in the Barrett Line fleet.

TWO Fairbanks-Morse engines, model 38D8⅛ OP, each rated at 640 hp at 720 rpm, power the new *H. B. Jordan*. The new towboat, completed at St. Louis Shipbuilding and Steel Co., for United States Steel Corp., measures 120 by 27 ft, and gets extra mention as the first large stainless steel towboat for inland waterways.

THE *Commercial*, 50 by 16 ft harborboat, is a current construction project for Marine Welding and Repair Works, Greenville, Miss. The boat, ordered by Shepard Marine, will be powered by two GM engines, rated at 165 hp each.

HORN'S Boat Shop, Shreveport, La., is active, with construction underway for a stock towboat, measuring 44 by 15 ft, with 300 hp from a GM engine.

MILL Ridge Coal Co., Birmingham, Ala., took delivery of their 69 by 32 ft towboat, from builders, Harrison Bros. Dry Dock and Repair Yard, Mobile, Ala. The craft is named *Barbee*, and is equipped with two Superior engines rated at 500 hp each.

THE *Ida P* and the *Ethelyn P*, identical sister switchboats built by Dubuque Boat and Boiler Co., are in service for the Tennessee Valley Authority. Each boat is equipped with two GM-6-71 engines, rated at 140 hp at 1600 rpm, and Kohler 10R027 remote control generators.

IN ANSWER to the inquiry as to what happened to the *Kansas City*, Federal Barge Line colorful towboat, the craft is renamed *Tom Sawyer*, and is in the 20th year of river service, the past ten years as a diesel.

THE NEW GM Model 8-498 turbocharged engines which supply the 2800 hp for the *Eleanor Gordon* get applause with the tremendous tows in the coal traffic. Owned by Mid-America Transportation Co., built recently at Nashville Bridge Co., the *Gordon* is gaining a well-earned reputation as the fleet's flagship.

THE LOVELY *Laura Lee* is another newcomer, with top performance record. Owned by Upper Mississippi Towing Corporation, built by St. Louis Shipbuilding and Steel Corp., this large, lovely towboat is rated by some rivermen in the top power class of 6,000 with power from three Fairbanks-Morse OP engines.

Production Facilities Expanded

Construction has started on a 289,000 sq ft addition to the General Motors Detroit Diesel Engine Division plant in Detroit. Clyde W. Truxell, general manager, said completion is expected next May. The new building will house all final assembly, testing, and shipping facilities for Detroit Diesel. Mr. Truxell said that new manufacturing methods, made possible by the expansion, "will make GM Diesel the most modern plant of its kind in production technology."

An entirely new production system will be installed, including the addition of two new assembly lines for a total of five assembly systems. The layout revisions will be made without interruption of production. "We will be able to assemble all engines in the new building, separating the assembly from machinery operations with associated advantages of improved efficiency and quality," Mr. Truxell said.

Detroit Diesel manufactures two cycle diesel engines ranging up to 893 hp in single and multiple units. The Division also produces electrical standby generator sets. This is the ninth plant expansion program since Detroit Diesel's founding in 1937. The new addition will increase total floor space to approximately 1,520,000 sq ft. There are six main buildings and a laboratory on the Division's 129-acre site. Detroit Diesel produced its 500,000th engine in June. Since its founding the Division has built and sold engines totaling more than 73,000,000 hp.

New Distributor

Marine Specialties of Oregon, Inc., a newly formed Oregon corporation, located at 2580 N. W. Upshur, Portland, Oregon, have announced that they are now the Northwest Distributors for American Marc marine diesel engines, as well as marine Aeroquip hose and fittings, Capitol reduction and reverse gears and American Bosch fuel pumps. They travel four salesmen in Oregon, lower Washington and Northern California territory. Officers for this new corporation are Ed B. Mitchell, LeRoy Skousan and Gordon A. Kalk. Marine Specialties of Oregon, Inc. offer twenty-four hour sales and service along with one of the most modern fuel pump and repair shops in the Northwest.

the best costs less
Simplicity is the word for ROOSA MASTER fuel injection pumps. Small in size and weighing less than 10 pounds, there are fewer parts to service, fewer adjustments, which means lower service costs.
Only one model size is adaptable for either a 2, 3, 4, 6 or 8 cylinder engine. Compare its initial cost and installation cost for further proof that the best costs less.
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makes good diesels better
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DIVISION OF STANDARD SCREW COMPANY
Roosa Master pumps have been proven under extensive field tests and years of dependable service.
YOU CAN DEPEND ON THE DIESEL THAT DEPENDS ON ROOSA MASTER

Rail Yard Modernization

Richmond, Fredericksburg and Potomac Railroad Company's Potomac Yard in Alexandria, Va., is fast becoming one of the most modern railroad yards in the country. This yard, one of the largest in the U. S., was one of the first to turn to the study and use of electronic devices for faster and more efficient classification of trains. Among these is one with which we are all familiar, and that is television. This innovation was the first of several phases R.F. & P. officials are planning to modernize the yard. The entire project will take five years and cost $5.5 million. The second phase of the modernization program, launched 1½ years ago, is nearly completed. It calls for the enlargement of the Southward Classification Yard. Nine new tracks are being added to this yard to provide for faster and additional classification of southward traffic. To make way for the expansion in the Southward Classification Yard, the east and west car shops have been consolidated into a single structure; a coal tipple has been demolished, and just under 50,000 cu yds of earth have been moved. Guy H. Lewis and Son, of McLean, Va., is the general and earthmoving contractor on this job. They are using three International crawler tractors on the project, a pair of TD-9's, one equipped with a Skid-Shovel and one towing a sheepsfoot roller, and a TD-18, equipped with dozer. These units are working on the fill to provide space for the additional tracks. The TD-18 is spreading material in 12-in. layers preparatory to rolling it. The TD-9, with roller, is compacting the material. The TD-9 Skid-Shovel is being used to clean up and do general loading work.

Heads New Department

Jules P. Kovacs

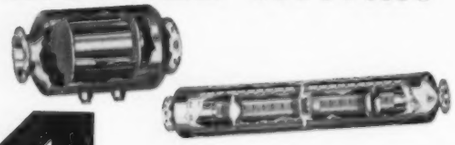
Jules P. Kovacs, vice-president in charge of research and development of Purolator Products, Inc., has been given the expanded responsibilities of new product marketing and special engineering services. The new organization signals an expansion by Purolator of product development and sales in industrial fields, such as chemicals, food processing, plastics, paints, fuel refining and nuclear applications. Mr. Kovacs joined Purolator in 1929 as a design engineer. He was named assistant chief engineer in 1935 and appointed chief engineer five years later. In 1950, Mr. Kovacs was named a vice-president of the company.

Mobile Generator Sets For Mexico

Five mobile generating plants permanently housed in tractor-trailer units left Springfield, Ohio recently on a precedent-setting trip for Mexico. The 500 kw generators, each capable of furnishing the normal power needs of a town of 2,500 people, are the first purchased for use in Mexico, by Comision Federal De Electricidad. Completely self contained, the mobile power plants are an ideal tool for use of the Comision Federal De Electricidad. Incorporating heavy duty engines built for continuous output they will be used to bring power to new areas, help in rerouting existing power lines and systems, and to meet peaks in power needs across Mexico. Purchase of the units is in keeping with the Mexican Power Industry's determination to provide an adequate supply of electricity for the mushrooming industry and commerce of the nation, as well as to bring the benefits of modern civilization to the rural areas.

The generators represent the latest word in highly-maneuverable, electric power units for modern utility systems. They are built into trailers 32 ft long, eight ft wide and 12½ ft high and are hauled

SILENCERS AND
SPARK ARRESTORS
SHIPPED WITHIN



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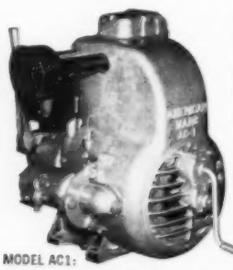
by America's largest manufacturer of AIR-COOLED DIESELS



MODEL AC1:
Air-cooled, one-cylinder, four-cycle. 6.5 BHP @ 1800 RPM. Wt.: 220 lbs.

MODEL KBA-605: 7.5 KW permanent magnet generator mounted to AC2 diesel engine. Wt.: 550 lbs.

MODEL AC2: Air-cooled, two-cylinder, four-cycle, V-type 14 BHP @ 1800 RPM. Wt.: 350 lbs.

AMERICAN MARC Inc. is the acknowledged leader in the field of lightweight, air-cooled diesel prime movers for all uses requiring 6.5 to 15 BHP. Prominent in the American MARC line is the new permanent magnet generator, available from 3 to 7.5 KW output. (AC or DC, and industrial three-phase). American MARC also manufactures rotating armature generators, refrigeration power units and diesel pumping units of various capacities for industrial and marine installations.

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Inglewood, California
Telephone OR 8-7174 6-104

wherever needed by White or Autocar trucks. The trailers are especially strengthened in chassis and sides for long service with their unique cargo. The heart of each set is a 755 hp Superior diesel engine operating at 900 rpm. The engines drive Ideal generators. Engines can pull continuous 500 kw load in operation to elevations above 8200 ft. Diesel fuel carried in a 280 gallon tank on the trailer's belly powers the engine. One tank of fuel will drive each unit at capacity for 12 hours. The units were designed with an eye to economy. All essential parts are standard production items and as such, can be mass-produced. A standard version of the Autocar truck can be used to haul the trailer. The engine is an eight-cylinder Model 40 Superior diesel.

Canadian Diesel Truck

This Hayes Clipper truck is fitted with the first Rolls-Royce diesel to go into a cab-over-engine installation in Canada. The supercharged six-cylinder engine is rated at 250 bhp at 2100 rpm. Purchased by Lee's Transport Ltd., the truck is operating out of Vancouver to the northern interior of British Columbia and the Yukon Territory. Similar installations, in both Hayes and Canadian Kenworth trucks, will shortly go into service with operators hauling for Midland Superior Freight Lines, from Calgary and Edmonton to Toronto and Montreal.

All Aluminum Executive Launch

Alcoa 5154 is new to the marine industry, but when formed into a hull designed by Philip L. Rhodes, Naval Architect and Marine Engineer, and built by Peterson Builders, Inc. of Sturgeon Bay, Wisconsin, a new era in fast, rugged launch building has opened up. The aluminum alloy, produced for its toughness, has a hard corrosion resistant surface which makes it ideal for boat hulls, but its more desirable properties mitigate against its use by fabricators who are not thoroughly experienced in working aluminum. The hull design was developed by Rhodes in answer to the demand for a fast lightweight launch that could get to the marine construction job in a hurry and maneuver around floating equipment at 30 miles an hour without creating a disturbing wake. The first two boats of the type have been delivered to South American oil producers for use on lakes and rivers in Venezuela. The designer and builder were enthusiastic following trials and predicted that the versatile launch would find favor with the marine construction executives, harbor pilots, harbor police and fire departments.

The vital statistics of the executive launch include an all aluminum welded hull having an overall length of 52 ft 3 in., a beam of 12 ft 8.5 in., and a draft of 3 ft 6 in. The 30 mph speed is produced by twin turbocharged, lightweight GM 6-71 diesels delivering power through a 1.5 to 1 reduction gear. The monel shafting is 1.75 in. and the propellors are Michigan 23 in. x 25 in. stainless steel wheels which have an effective 105 sq in. developed blade area. Twin rudders answer the helm through GM worm geared steering apparatus. Auxiliaries include two 300w 12v battery charging generators driven by the main engines that furnish power for starting and the ship-to-shore radiophone. Other equipment includes a Marine Products L-300 bilge pump and an auxiliary hand pump. Fire extinguishers include one 50# CO_2 automatic Walter Kidde engine room installation and two Ansul chemical extinguishers. The engine room and the overhead of the wheel house are insulated and soundproofed with aluminum perforated plate over fiber glass of maximum effective thickness. The mast is hinged to clear obstructions.

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MEANS FULL PROTECTION
FOR YOUR DIESELS

FRAM WATER SEPARATOR AND
FUEL FILTER TRAPS DIRT AND DUST,
REMOVES ALL WATER.

Here's protection that pays off in performance. 100% efficiency in removing water that pits and corrodes injectors. Dirt and dust are trapped, rust and contaminants eliminated for good.

Reduce down time, save on maintenance . . . keep your Diesels working full time with FRAM Full-Filtration.

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Mid-Continent Diesel News

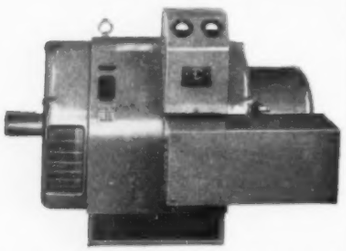
By Jack F. Cozier

CITY OF Marion, Kan., has bought a Fairbanks, Morse model 33FD16, eight cylinder, 1600 hp dual fuel generating set.

Get the latest!

A COMPLETELY NEW "PACKAGED" GENERATOR

AMP-PAK



AMP-PAK Generator shown is rated at 187 kva, 1200 rpm, 240/480 volts. AMP-PAK is available in ratings of 75 thru 187 kva at 1800 rpm and 62½ thru 187 kva at 1200 rpm. Three phase, 80% PF, 60 cycles, 50C rise, and 120/208, 240 and 480 volts.

No exciter . . . No moving parts in the voltage regulator

AMP-PAK is a compact, revolving field a-c generator with built-in, static excitation system; static voltage regulator; and basic metering and controls conveniently grouped. AMP-PAK is a portable unit, factory assembled, internally connected, and tested.

No rotating exciter to maintain. D-C excitation is provided by a heavy duty, long-life, static rectifier.

No tubes, relays, vibrators to service. Voltage is regulated by a static, E-M-developed sensing circuit and "magical" magnetic amplifiers.

Holds voltage "rock-steady" so your motors, lights, and electronic equipment will work better. The static regulator provides ±2% regulation.

Starts big motors. A special, built-in voltage booster transformer stands by to reinforce line voltage when heavy loads are suddenly applied.

Easy to install. Needs no switchboard. Just connect load to AMP-PAK thru a suitable line switch.

Simple to operate. Has no belts, no "tricky" commutator, no adjustments—anyone can operate AMP-PAK.

See your nearest E-M Sales Engineer and write the factory for publication PRD-236.

E-M

ELECTRIC MACHINERY MFG. COMPANY
Minneapolis 13, Minnesota

Largest manufacturer of "Packaged" Generators

2100-TPA-2154

SERVICE Pipe Line Co., Tulsa, Okla., has purchased three Alco 1000 rpm model V-16-251B dual fuel pipe line pumping engines for Service Pipe's Wyoming line. The 2000 hp units will be driving centrifugal pumps. The sale was made through the Tulsa office of Alco Products, Inc.

CURT Brown Drilling Co., Pawhuska, Okla., bought a GM model 62406RD 274 hp diesel engine from Diesel Power Co., Oklahoma City, Okla. The series 6-110 diesel unit will be used on a Brown drilling rig.

SERVICIOS Tecnicos Orientales, C. A., of Venezuela took delivery on a rig powered by four Cummins VT-12 turbodiesel engines with Twin Disc torque converters. Included in the rig are a Unit Rig U-914-B drawworks with 46 in. Parkersburg hydromatic brake, Mid-Continent 4AE rig drive and a 142 ft Lee C. Moore mast.

PONCA CITY Hospital, Ponca City, Okla., purchased a GM model 4150 diesel standby emergency generator set with an 80 kw capacity. The installation done completely by Diesel Power Co., Oklahoma City, Okla. The set utilizes Automatic Switch Co. transfer switches and automatic engine controls by Lake Shore Electric.

SOUTHEASTERN Drilling Co., Dallas, Tex., recently sent two 20,000 ft drilling rigs to Iran. The units were completely assembled and tested by S & R Tool and Supply Co., Houston, Tex., at their plant before being sent to Iran. Major machinery included are Oilwell 96 drawworks, Oilwell 1600 sectional compound with GM Quad engines and model 816 Oilwell pumps.

LEO BASSETT, Inc., Wichita, Kan., replaced the power unit for a centrifugal sand pump with a GM model 4031-C, 127 hp series 4-71 diesel engine from Diesel Power Co., Oklahoma City, Okla.

HALLIBURTON Oil Well Cementing Co., Duncan, Okla., purchased four Cummins VT-12-BI diesel engines from Cummins Sales & Service, Fort Worth, Tex. The 600 hp units will be installed with a Howco pump.

WHITE'S Uvalde Mines, Dabney, Tex., at a quarry and rock crushing plant utilizes four Sterling dump trucks powered by Cummins HB-600 diesel engines, two Euclid 27FD trucks powered with Cummins HBID-600 engines, a Euclid 36TD truck with a Cummins NHRS-600 unit, a General Electric locomotive powered with a Cummins HBI-600 and a model 54-B Bucyrus Erie shovel powered by a Cummins NHRS-600. This quarry produces a high grade asphalt.

DOLESE Brothers Co., Big Canyon, Okla., have repowered a Euclid rear dump unit with a GM model 6094, series 6-71 diesel engine from Diesel Power Co., Oklahoma City, Okla.

FALCON-SEABOARD Drilling Co., Tulsa, Okla., is replacing on one of their drilling rigs their present power units with three GM model 12103, 381 hp each, series 6-71 twin diesel engine units from Diesel Power Co., Oklahoma City, Okla.

LEO BASSETT, Inc., Wichita, Kan., recently replaced the power unit of a sand dredge with a GM model 62406RD, 274 hp, series 6-110 diesel engine from Diesel Power Co., Oklahoma City, Okla.

Opens New District Office

De Laval Separator Co. has announced the opening of a new district office at 121 Coulter Avenue, Ardmore, Pennsylvania. Mr. George G. Teren, Jr., formerly a sales engineer working out of De Laval's Pittsburgh office, will take over as manager of the new district office. It was announced by De Laval that the new office will have complete facilities for servicing the centrifugal and Plate Heat Exchanger needs of manufacturing concerns in the Pennsylvania area.

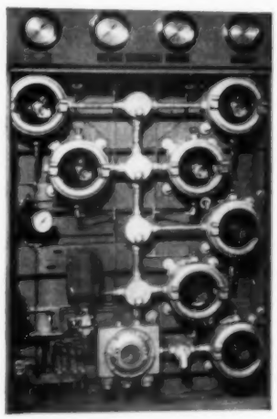
Last Call For Exhibitors

There are only a few spaces left in the exhibits area for the Oil and Gas Power Division of the ASME Meeting to be held at the Bellevue-Stratford Hotel, Philadelphia from May 12 through May 15. Those who want to exhibit their company products before so many important buying influences in the Original Equipment Market and amongst users of engines in the field are urged to make their reservations for exhibit space right now, before it is too late and the exhibit spaces are all sold out. Contact the exhibits chairman, John E. Onnen, Koppers Co., 122 S. Michigan Ave., Chicago 3, Ill. to place your reservation.

General Sales Manager

William E. Wilkening, President of Wilkening Manufacturing Co., Philadelphia, maker of Pedrick piston rings, announces the promotion of John O. Lutz to the newly-created post of General Sales Manager. Mr. Lutz will supervise the sales activities of the Automotive Replacement Division of which Mr. Ralph W. Doherty continues as Sales Manager, of the Industrial Division of which Mr. Harold R. Kelly continues as Sales Manager, of the Manufacturers or Original-Equipment Division and of the Export Division. In 1940, Mr. Lutz was graduated from the Massachusetts Institute of Technology with a B.S. degree in Mechanical Engineering. He has had extensive experience in production, design and development of internal combustion engines with such concerns as Baldwin-Lima-Hamilton Corp. and North Carolina Shipbuilding Co. and for over four years as Engineer Officer on various vessels for the United States Navy. Most recently, he has been Chief Engineer for Wilkening.

PROTECTION for GAS TURBINES



MERCOID SAFETY CONTROL PANELS

Illustration above is a typical custom made explosion proof Mercoid Safety Control Panel which safeguards Gas Turbines by providing the following control functions:

Clutch pressure • High pressure lube oil • Axial compressor discharge • Bearing lube oil pressure • Fuel supply pressure • Overspeed pressure • Impeller pressure • Starting turbine throttle pressure • Lube oil high temperature • Exhaust temperature shutdown • Exhaust temperature alarm.

There are many more safety functions Mercoid can provide—our engineers will be pleased to offer their recommendations on the proper application of Mercoid Safety Controls for your gas turbines.

Write for details

THE MERCOID CORPORATION
4201 Belmont Ave., Chicago 41, Ill.

Assistant General Manager

George Steven has been appointed Assistant General Manager of the Compressor and Engine Division of Worthington Corporation in Buffalo, New York. Mr. Steven, Manager of Engineering at Buffalo since 1945, graduated from the Royal Technical College, Glasgow, Scotland in 1923. He has been with Worthington for thirty-one years. Harold W. Whiting succeeds Mr. Steven as Manager of Engineering. Mr. Whiting spent several years with Skinner Engine Company in Erie, Pennsylvania before joining Worthington in 1939 as a design engineer. He has served successively as Assistant Chief Engineer and Chief Engineer of the Compressor Section and has been Assistant to the Manager of Engineering since 1952. Mr. Whiting attended the Case School of Applied Science.

Names Executive Vice-President

George Engine Company, Inc. of Harvey, La., General Motors Diesel Engine Distributor, announces the appointment of H. F. Colby as Executive Vice-President and General Manager of the Corporation. Mr. Colby had previously been Sales Manager of the firm for a number of years. Harry Foy has been appointed Sales Manager to succeed Mr. Colby, and brings with him to this new post extensive experience in the engine field. His business background includes a position as Shop Manager of an engine re-manufacturing firm.

Assistant Sales Manager

James R. Strother has joined Flexonics Corporation, Maywood, Illinois, as Assistant Sales Manager for Industrial Hose Products. In his new position, Strother heads up Flexonics' national sales program for metal, synthetic rubber and plastic hose products to manufacturers of original equipment in the agricultural, construction and general industrial fields.

Municipal Plant Buys Engine

The City of Russell, Kansas has purchased a Nordberg two-cycle Duafuel engine for their municipal power plant. The engine rated 4200 bhp at 257 rpm, will drive a 3000 net kw generator. The new engine-generator unit is scheduled for installation by June, 1958. With eight cylinders of 21½ in. bore, it will be the second largest generating unit in the plant. The present base load unit is a ten cylinder, 21½ in. bore Nordberg which went on the line in June 1955. This Duafuel engine is rated 4800 bhp, 3425 net kw at 240 rpm. A. C. Kirkwood & Associates, Kansas City, Missouri are the consulting engineers for this latest expansion of the municipal plant. The new Nordberg will increase the plant's capacity by more than 27 per cent.

Tankers Prefer Diesels

A Norwegian daily newspaper, prominent within the shipping world, *Norges Handels- og Sjofartstidende*, has recently completed a survey of Norway's fleet of tankers of a capacity exceeding 30,000 tons d.w. which were in service at the end of 1957. The paper has devoted special interest to the distribution of the tankers on turbine machinery and diesel engines. It appears that of the 24 tankers included in the survey, 16 or 66⅔ are diesel engine-driven and only 8 are turbine-driven. Twelve or 75% of the diesel-driven ships, corresponding to half the entire tanker fleet including turbine ships, are fitted with Burmeister and Wain engines. The paper further expresses the view that Norwegian owners have been pioneers in the introduction of diesel engines as propelling machinery for supertankers, and indicates that a similar development will take place within the world's fleet of supertankers —at any rate as far as groups of certain capacities are concerned.

Miniature Couplings

"Miniaturization" is big news today, for this is the age of transistors, and of other tiny titans with stupendous strength which exert power out of all proportion to their size. The Thomas Flexible Coupling Company of Warren, Pennsylvania, has made a contribution to miniaturization by developing tiny power couplings, smaller than a car ignition key in length, and with a circumference less than that of a half-dollar. These miniature couplings, which are described in Bulletin MC-100, are for use on servo-mechanisms, computers, missiles, and other devices requiring small-size components for power transmission. They are non-magnetic and light-weight, with low elastic yield under torque. Except for stainless steel setscrews, they are constructed entirely of non-ferrous materials such as anodized aluminum alloy, beryllium copper and brass. Couplings of materials other than these can be furnished for special applications, however. Special steels may be specified for high strength applications where magnetic effects are of no concern, or a wide variety of non-ferrous materials may be indicated to permit operation in corrosive atmospheres, under high temperatures, or where the insulating properties of the coupling material are an important factor. A copy of Bulletin MC-100 on these couplings may be obtained free upon request. Write Thomas Flexible Coupling Company, Warren, Pennsylvania. ITS NEW

Diesel Distributor

The appointment of Rex Engineering Corporation, 518-520 Light Street, Baltimore 2, Maryland, as exclusive representative for the State of Maryland for Deutz diesel engines was announced recently by Diesel Energy Corporation, 82 Beaver Street, New York City, United States representative of Kloeckner-Humboldt-Deutz A.G., Cologne, West Germany.

M-M General Sales Manager

M. E. Carroll, director of field sales, has been promoted to general sales manager of Minneapolis-Moline Company, manufacturers of farm and industrial tractors, engines and machinery. Carroll assumes responsibility for all sales operations, industrial, OEM, export, and farm. He will also have charge of the departments of market research, advertising, customer services, parts, technical publications, and the service organization.

Locomotives for Argentina

Alco Products, Inc. has started shipments of a new all-purpose export diesel locomotive on volume order from the Argentine State Railways. The company shipped 16 of the six-motor, 1800 hp DL-540 road-switcher locomotives through mid-January. Production on the Argentine order, totalling 130, was started in December. The DL-540 is an export version of Alco's domestic road-switchers, the four-motor DL-701 and the six-motor DL-702, which were introduced two years ago. More than 200 of these locomotives are now in domestic service. Of the Argentine order, 30 locomotives will be placed in service on the D. F. Sarmiento Railroad, 55 will go to the General Mitre Railroad and 45 to the General San Martin. Delivery will be completed this year. The DL-540 is powered by Alco's 12-cylinder, vee-type Model 251 turbocharged diesel engine, the power unit that is standard in one of three sizes on all Alco locomotives.

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Volume Twenty-Two

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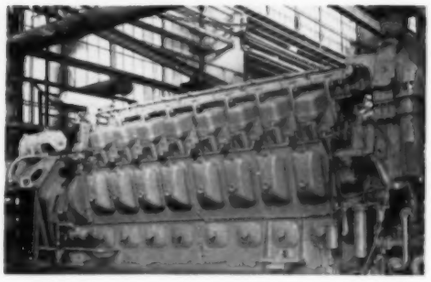

Alco Products, Inc. has recently completed shipment from its Auburn plant of six diesel-generator sets to provide operating power for an Air Force radar station. The skid-mounted power packages were supplied to the General Electric Company on an order valued in excess of $800,000. The location of the radar post they will power was not disclosed. Each of the power packages consists of a 16-cylinder Alco Model 251-B diesel engine and a 1300-kw General Electric ac generator. The vee-type Alco engines develop 1830 bhp in this application, and both the engine and generator will operate at 900 rpm. Each engine-generator set was completely tested under simulated operating conditions prior to shipment.

Towboat For Bahama Islands

The twin screw towboat, *William L.*, recently put to work in the Bahamas Island area adds another vessel to the long list of towboats and other craft launched at the yards of the Diesel Shipbuilding Company near Jacksonville. The vessel is built to give long trouble free service under rugged island operating conditions plus packing a lot of dieselized horsepower in a relatively small hull. The *William L.* has an overall length of 65 ft, a molded beam of 17 ft 3 in. and a depth of 8 ft 6 in. Her construction is of mild steel manually arc welded. The shell plate is 5/8 in. with 5/16 in. deck and bulkheads. The deckhouse is of 3/16 in. steel plus 3 x 2 x 5/8 in. steel frames. Her fuel oil capacity is 6000 gals. along with a cargo capacity of 1500 cu ft.

She is powered by a pair of D375 turbocharged Caterpillar diesel engines, each rated 430 hp. The diesels are equipped with air starting; the reduction gears are 2.93:1 with air operated reverse gears. The main engine is equipped with stub shafts to operate a 1¼ in. Jabsco pump plus a 3 in. fire pump. Electrical power is furnished by an air cooled Onan diesel 5 kw, 115/230 volt, ac, single phase 60 cycle generating set. Built for the Mill Division of Owens-Illinois Glass Corp., it will call Jacksonville, Florida, her home port but will operate primarily in the Bahamas Islands.

Huge Dump Trucks Placed In Service

Five 64-ton semi-trailer dump trucks—probably among the largest rear dump semi's ever built—have been placed in operation at Kaiser Steel's Eagle Mountain iron ore mine in the southern California desert. They, and five more to follow, will haul ore from the open pit mine to the crushing plant. The Kenworth 803-B trucks are powered by 400 hp, 12-cylinder, vee type Cummins diesel engines and measure nearly 42 ft from front bumper to the rear of the single axle semi-trailer. Gross vehicle weight rating of the truck is 228,000 lbs or 114 tons. Equipped with power steering and power brakes, the trucks have one-man ventilated cabs which afford maximum vision in all directions. For greater protection against impact and abrasion, the dump bed of each trailer is lined with Kaisaloy plate, a high-strength, abrasion-resistant steel produced by Kaiser Steel at its Fontana, California, mill. When dumping, the tractor moves back and under the trailer which is kept immobilized by locking the rear wheels. Simultaneously, a hydraulic telescopic hoist raises the trailer bed to dump the ore.

The trucks are the first five units of their model produced at Kenworth's Seattle plant. Too large to travel on ordinary highways, the trucks were shipped by rail in three sections to Eagle Mountain for assembly. The Eagle Mountain mine includes the largest known body of high grade iron ore in the West and is the main source of ore for Kaiser Steel's Fontana mill. Production from the mine will be stepped up soon to meet the requirements of a fourth blast furnace now under construction at the mill as part of the company's $194,000,000 expansion program.

Diesels Speed Pipeline Construction

Midwestern Constructors, Inc., Tulsa, Okla., is moving along at a 4,000 ft daily pace, working 10 hrs a day, 6 days a week on their 51.9 mi. pipeline project between Morris, Ill., and suburban areas of Chicago. As much as 6,400 ft of line has been put in on this job in 10 hrs. The Tulsa firm is laying 47.5 mi. of 36 in. and 4.4 mi. of 34 in. pipe for a natural gas line. Started September 30, the line is due to be completed early in 1958. Midwestern is laying the pipe for Texas-Illinois Natural Gas Pipeline Co., Texas, Ill. Midwestern is using 10 units of their fleet of 21 International crawler tractors on this job. They are using 10 TD-24's, 8 equipped with Superior sidebooms and the other two with dozers, plus an International U-372 powering a Crose-Cummings-Rolf cleaning machine, and a U-4 powering a CRC doping and wrapping machine. One of the two TD-24's with dozers is used for general right-of-way clearing and leveling work, and the other on miscellaneous operations. The TD-24's with sidebooms are distributed over the spread as follows: one cradling pipe for the cleaning machine, one handling the dope and wrapping machine, four on lowering in, and two on tie-ins and miscellaneous jobs. Pipeline right-of-way follows general farm terrain, with two major river crossings of the DuPage River. One crossing will be 700 ft and the other 400 ft.

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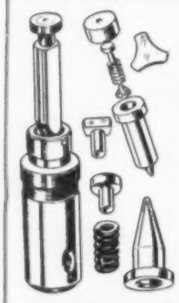

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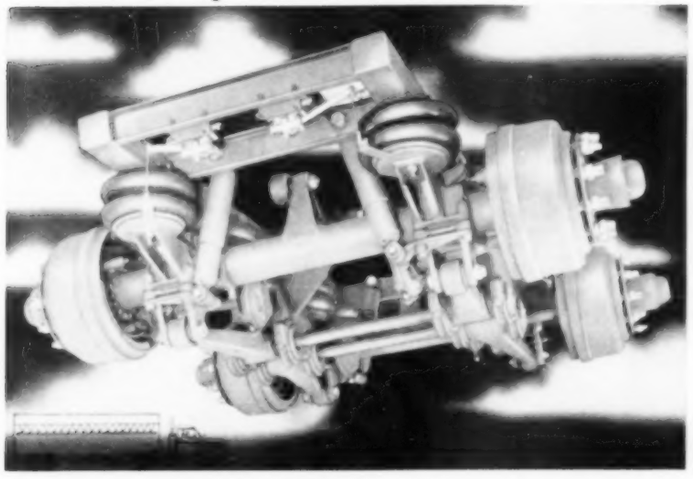

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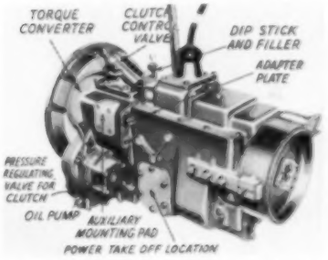

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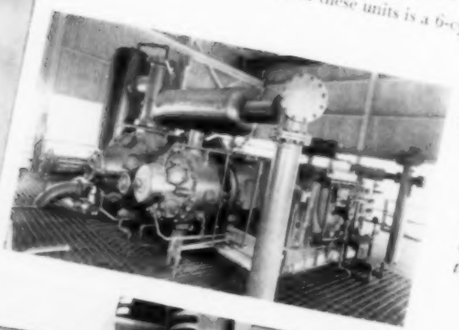

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